

EXHIBIT 19

1

1 UNITED STATES DISTRICT COURT

2 DISTRICT OF MINNESOTA

3 - - - - - - - - - - - - - - - - - - -

4 In Re:

5 Bair Hugger Forced Air Warming

6 Products Liability Litigation

7

8 This Document Relates To:

9 All Actions MDL No. 15-2666 (JNE/FLM)

10 - - - - - - - - - - - - - - - - - -

11

12

13 DEPOSITION OF THOMAS H. KUEHN

14 VOLUME I, PAGES 1 - 351

15 JULY 10, 2017

16

17

18 (The following is the deposition of THOMAS
19 H. KUEHN, taken pursuant to Notice of Taking
20 Deposition, via videotape, at the offices of Ciresi
21 Conlin L.L.P., 225 South 6th Street, Suite 4600,
22 Minneapolis, Minnesota, commencing at approximately
23 9:25 o'clock a.m., July 10, 2017.)

24

25

1 APPEARANCES:

2 On Behalf of the Plaintiffs:

3 Gabriel Assaad
KENNEDY HODGES
4 4409 Montrose Boulevard, Suite 200
Houston, Texas 77006

5
6 Genevieve M. Zimmerman
MESHBESHER & SPENCE, LTD.
1616 Park Avenue
7 Minneapolis, Minnesota 55404

8 On Behalf of Defendants:

9 Peter J. Goss and Vinita Banthia
BLACKWELL BURKE P.A.
10 432 South Seventh Street, Suite 2500
Minneapolis, Minnesota 55415

11 ALSO PRESENT:

12 Ronald M. Huber, Videographer

13 Kansaa Nadeem, Summer Associate, Blackwell
14 Burke

15

16

17

18

19

20

21

22

23

24

25

3

1 I N D E X

2	EXHIBITS	DESCRIPTION	PAGE MARKED
3	Ex 1	Expert report of Thomas H.	
4		Kuehn	33
5	2	Corrected Exhibit C to Kuehn	
6		expert report	33
7	3	Subpoena to Produce Documents,	
8		Information, or Objects, or to	
9		Permit Inspection of Premises in	
10		a Civil Action	37
11	4	Kuehn invoices	49
12	5	University of Minnesota website	
13		download re ANSYS	71
14	6	ME 4054: Ethics in Design	
15		PowerPoints	106
16	7	E-mail string, 3MBH01330587-92	159
17	8	E-mail string, 3MBH00544754-5	164
18	9	E-mail string, 3MBH00132501-2	168
19	10	E-mail string, 3MBH00050932-3	170
20	11	E-mail with attachment,	
21		3MBH00053467-72	183
22	12	Kuehn invoices	187
23	13	HVAC Design Manual for Hospitals	
24		and Clinics, Second Edition	253
25	14	CFD image	267

4

1 15 Article in Journal of Solar Energy,
2 Airborne Infection Control in
3 Health Care Facilities, by
4 Kuehn

292

5

6

7

8

9	WITNESS	EXAMINATION BY	PAGE
10	Thomas H. Kuehn	Mr. Assaad	5
11		Mr. Goss	328
12		Mr. Assaad	339
13		Mr. Goss	348

14

15

16

17

18

19

20

21

22

23

24

25

1 P R O C E E D I N G S

2 (Witness sworn.)

3 THOMAS H. KUEHN

4 called as a witness, being first duly sworn,

5 was examined and testified as follows:

09:24:57 6 ADVERSE EXAMINATION

09:24:57 7 BY MR. ASSAAD:

09:25:03 8 Q. Good morning. Can you please state your

09:25:04 9 name.

09:25:04 10 A. Yes. My name is Thomas Howard Kuehn.

09:25:07 11 Q. Do you go by Mr. Kuehn or Dr. Kuehn?

09:25:11 12 A. Dr. Kuehn is just -- is fine.

09:25:14 13 Q. Okay. My name's Gabriel Assaad and I'm here

09:25:19 14 with Genevieve Zimmerman, and we represent over 2,000

09:25:24 15 plaintiffs in this multi-district litigation. Now

09:25:27 16 before I begin I just want to go over a few

09:25:29 17 instructions.

09:25:29 18 Have you ever had your deposition taken?

09:25:30 19 A. I have.

09:25:30 20 Q. Approximately how many times?

09:25:31 21 A. Twice.

09:25:32 22 Q. Well I'm going to go through a couple of the

09:25:36 23 ground rules. I'm going to ask you numerous

09:25:40 24 questions. If you don't understand my question,

09:25:41 25 please let me know. Fair?

09:25:42 1 A. Yes.

09:25:42 2 Q. If you answer the question, I'll assume --

09:25:45 3 I'll assume that understood the question. Fair?

09:25:46 4 A. Yes.

09:25:47 5 Q. Any time you want to take a break, please

09:25:49 6 let me know. I just ask that if you request a break,

09:25:53 7 let it be after you answer a pending question. Fair?

09:25:55 8 A. Okay.

09:25:57 9 Q. Also, with respect to any of your testimony

09:26:01 10 today, I would not like you to guess. If you don't

09:26:04 11 know the answer, just say "I don't know." Fair?

09:26:06 12 A. Yes.

09:26:07 13 Q. I don't think any side here wants any

09:26:09 14 guessing. Fair?

09:26:10 15 A. Yes.

09:26:11 16 Q. Okay. Now the two depositions that you took

09:26:17 17 previously, were they as an expert witness?

09:26:20 18 A. Yes, they were.

09:26:21 19 Q. Okay. Can you please describe the two.

09:26:24 20 A. The first one was a case involving a hotel

09:26:28 21 fire in International Falls, Minnesota. The power

09:26:31 22 company had cut power to the building, this was in

09:26:35 23 winter, so my expertise was requested to determine how

09:26:42 24 fast the building would cool off and how fast the

09:26:45 25 water in the sprinkler-system pipes would freeze such

09:26:48 1 that the sprinkler system would be inoperable prior to
09:26:51 2 the fire breaking out.

09:26:52 3 Q. And were you an expert for the plaintiff or
09:26:54 4 the defendant?

09:26:54 5 A. That was the plaintiff.

09:26:55 6 Q. Okay. And do you recall the name of the
09:26:57 7 attorney you worked for?

09:26:58 8 A. Yeah. That was about 25, 30 years ago.

09:27:00 9 I -- I do not recall.

09:27:01 10 Q. Okay. Was it here in Minnesota?

09:27:03 11 A. Yes.

09:27:04 12 Q. And do you recall any of the attorneys on
09:27:09 13 the defense side?

09:27:09 14 A. That was so long ago, no, I don't recall.

09:27:12 15 Q. Okay. So 25 years ago, so looking at about
09:27:14 16 early '90s?

09:27:15 17 A. Probably maybe late '80s, early '90s.

09:27:18 18 Q. And you -- you did a deposition; correct?

09:27:21 19 A. Yes.

09:27:21 20 Q. Did you testify at trial?

09:27:23 21 A. Yes.

09:27:24 22 Q. And what was the verdict?

09:27:26 23 A. The plaintiffs did not prevail.

09:27:29 24 Q. Okay. So it was a defense verdict.

09:27:31 25 A. Yes.

09:27:33 1 Q. Okay. And during that --

09:27:36 2 During your time being an expert for the

09:27:39 3 plaintiff in that case, were any of your opinions

09:27:43 4 limited by the court?

09:27:46 5 A. It was so long ago, I really don't -- don't

09:27:49 6 remember.

09:27:50 7 Q. Okay. Now you said you were an expert -- or

09:27:53 8 you testified in another case.

09:27:54 9 A. Yeah. The second case was with Rochester

09:27:58 10 Meat & Provision Company in Rochester, Minnesota.

09:28:01 11 They -- they are a provider of hamburger patties to

09:28:04 12 restaurant chains. They had recently purchased and

09:28:09 13 installed a large spiral blast freezer to improve

09:28:12 14 their productivity, their output. The blast freezer

09:28:16 15 did not perform according to the specifications

09:28:20 16 supplied by the vendor, so Professor Ramsey and I and

09:28:25 17 a graduate student were initially contacted to just

09:28:28 18 serve as consultants to see if we couldn't resolve the

09:28:31 19 problems. We actually did measurements in their

09:28:36 20 freezer, temperature of patty measurements versus

09:28:38 21 time, freezer temperature, airflow measurements. They

09:28:41 22 adjusted their production to the best they could, they

09:28:43 23 still could not meet production as specified in the

09:28:47 24 requirements, so it went into litigation and I was

09:28:50 25 retained as an expert witness on behalf of Rochester

09:28:53 1 Meat.

09:28:53 2 Q. For the defendant.

09:28:55 3 A. For the plaintiff.

09:28:55 4 Q. For the plaintiff. Okay. And what was the

09:28:59 5 outcome of that case?

09:29:00 6 A. Outcome of that case was a settlement.

09:29:03 7 Q. And did you -- did you --

09:29:06 8 If it was a settlement, you didn't testify

09:29:09 9 at trial; correct?

09:29:10 10 A. Actually, I was on the stand when there was

09:29:13 11 a recess, and then I was told shortly after that that

09:29:13 12 a settlement had been reached.

09:29:13 13 Q. Okay. So you did a deposition and testimony

09:29:16 14 and --

09:29:16 15 A. Yes.

09:29:17 16 Q. -- trial testimony.

09:29:18 17 A. Yes.

09:29:18 18 Q. One more instruction. Wait until I finish

09:29:20 19 the question before you answer, and I'll trying to do

09:29:22 20 the same, I'll try to wait until you finish your

09:29:25 21 answer. It's better for the court reporter, it's a

09:29:28 22 cleaner transcript. Fair?

09:29:29 23 A. Yes.

09:29:29 24 Q. And I understand many times you will predict

09:29:31 25 what my question is going to be; just wait just until

10

09:29:34 1 I finish the question. And I will usually look up at
09:29:36 2 you and wait for an answer.

09:29:38 3 A. Okay.

09:29:39 4 Q. Do you have copies of any of the
09:29:44 5 transcripts, deposition transcripts in your previous
09:29:46 6 cases where you acted as an expert?

09:29:49 7 A. Again, this was also 25, 30 years ago. I --
09:29:53 8 I certainly do not have anything in my possession at
09:29:55 9 present.

09:29:55 10 Q. So --

09:29:57 11 And that would have been in the late '80s
09:29:59 12 for Rochester Meat?

09:30:00 13 A. Again, either late '80s or early '90s.

09:30:03 14 Q. Okay. Fair enough.

09:30:04 15 Besides those two cases in which you
09:30:08 16 testified either in a deposition or trial, were you
09:30:10 17 ever retained by a law firm as a consulting expert?

09:30:15 18 A. Not that I can recall.

09:30:20 19 Q. And so my understanding with respect to the
09:30:31 20 first case dealing with the pipes freezing, that dealt
09:30:39 21 with mostly, you know, how fast a building would cool
09:30:44 22 down and how fast the pipes would get down to below
09:30:47 23 freezing and freeze.

09:30:48 24 A. That's correct. It was really a heat-
09:30:50 25 transfer study.

09:30:51 1 Q. Okay. And that would be the same thing with

09:30:55 2 the Rochester Meat, it was more of a heat-transfer

09:31:00 3 problem.

09:31:00 4 A. Yes, that's correct.

09:31:01 5 Q. And nothing to do with fluid flow or

09:31:04 6 particle flow; correct?

09:31:06 7 A. Nothing to do with particle flow, although

09:31:09 8 there was fluid flow involved in the hamburger-

09:31:13 9 freezing blast freezer.

09:31:14 10 Q. Fair enough.

09:31:15 11 Have you ever consulted for 3M before?

09:31:29 12 A. No, I have not.

09:31:31 13 Q. What about Arizant?

09:31:32 14 A. No, I have not.

09:31:34 15 Q. Before this litigation were you aware of a

09:31:37 16 company called Arizant?

09:31:39 17 A. Not that I recall, no.

09:31:43 18 Q. What about Augustine Medical, had you ever

09:31:45 19 heard about Augustine Medical before this litigation?

09:31:48 20 A. No.

09:31:49 21 Q. Do you know who Scott Augustine is?

09:31:52 22 A. I did not before this litigation began.

09:31:55 23 Q. Fair enough.

09:31:56 24 So you've been retained as an expert in this

09:31:58 25 case; correct?

12

09:31:59 1 A. That's correct.

09:31:59 2 Q. And as an expert you would agree that when

09:32:01 3 you look at a problem, you should be objective;

09:32:04 4 correct?

09:32:04 5 A. That's correct.

09:32:04 6 Q. You're not here to be an advocate for 3M or

09:32:08 7 the plaintiffs; correct?

09:32:09 8 A. I'm just trying to deliver my expertise

09:32:15 9 and -- and be as accurate and honest as possible.

09:32:18 10 Q. To be objective and be impartial; correct?

09:32:22 11 A. That's correct.

09:32:24 12 Q. And you're aware that you're under oath;

09:32:30 13 correct?

09:32:30 14 A. Yes.

09:32:31 15 Q. And that means that here today it's like

09:32:34 16 being in trial; correct?

09:32:35 17 A. I -- I assume that's correct.

09:32:37 18 Q. Okay. And you understand that your

09:32:42 19 testimony should be -- should be truthful.

09:32:44 20 A. Yes.

09:32:45 21 Q. And objective.

09:32:46 22 A. Yes.

09:32:47 23 Q. And it's under the penalty of perjury if

09:32:50 24 you're not truthful. Do you understand that?

09:32:53 25 A. Yes.

09:32:56 1 Q. Now what's your current status at the
09:32:59 2 University of Minnesota?

09:33:00 3 A. I retired approximately one year ago, so I'm
09:33:04 4 officially a professor emeritus.

09:33:08 5 Q. And you understand as a professor in an
09:33:12 6 academic institution, providing false data or false
09:33:18 7 results would be considered fraudulent; correct?

09:33:21 8 MR. GOSS: Object to form.

09:33:22 9 A. That's certainly not according to the
09:33:24 10 ethical standards I was -- I was raised to believe in.

09:33:29 11 Q. Okay. When you talk about ethical
09:33:30 12 standards, you're talking about engineering ethics?

09:33:32 13 A. Yes.

09:33:33 14 Q. And such, you know, providing false data or
09:33:36 15 false results would be considered fraudulent; correct?

09:33:39 16 MR. GOSS: Object to form.

09:33:40 17 A. I -- I would believe so.

09:33:43 18 Q. Okay. And sitting here today, you wouldn't
09:33:47 19 put -- you would never commit -- strike that.

09:33:49 20 It's my understanding that you recently went
09:34:00 21 over your report and checked all your calculations;
09:34:02 22 correct?

09:34:02 23 A. That's correct.

09:34:06 24 Q. Okay. And you did that on Friday; correct?

09:34:06 25 A. One of the exhibits, not the entire report.

14

09:34:11 1 Q. Okay. But you have checked your report for
09:34:13 2 accuracy; correct?
09:34:14 3 A. Yes.
09:34:15 4 Q. And being a pro -- professor emeritus, you
09:34:19 5 would never -- you would never commit research fraud
09:34:21 6 or put your name on a court document that you do not
09:34:27 7 believe in; correct?
09:34:28 8 A. I would say that's correct.
09:34:33 9 Q. And I assume when you checked all your work
09:34:36 10 prior to -- in preparation of this deposition, that
09:34:40 11 all your calculations made engineering sense; correct?
09:34:42 12 A. They -- they certainly made engineering
09:34:46 13 sense when I was developing them initially. Of course
09:34:50 14 all engineering calculations are subject to some level
09:34:52 15 of uncertainty in some of the values that are -- that
09:34:57 16 are put in. But within engineering judgment, I
09:35:03 17 believe they to be -- them to be correct.
09:35:05 18 Q. So are there some --
09:35:07 19 Are you sitting here today to say that some
09:35:11 20 of the numbers that were used in your calculations
09:35:13 21 you're uncertain about?
09:35:15 22 A. I would say the precision of some of the
09:35:17 23 numbers I -- I do not know very precisely.
09:35:21 24 Q. Can you elaborate on that a little bit?
09:35:25 25 A. I would say my definition of "precision"

09:35:28 1 would be, for example, how many significant figures of
09:35:30 2 a number you believe are absolutely correct, and in
09:35:36 3 many cases an engineer needs to make a -- a judgment
09:35:39 4 call in terms of how many significant digits are --
09:35:43 5 are defensible and -- and how many are perhaps digging
09:35:49 6 a little bit too keep into the details.

09:35:51 7 Q. Are any of the numbers that you have
09:35:56 8 measured or used -- strike that.

09:36:00 9 Now we're going to go through your report
09:36:06 10 today. If any time you realize that any of your
09:36:08 11 calculations are wrong or your statements are wrong,
09:36:11 12 can you please let me know?

09:36:12 13 A. I will let you know, yes.

09:36:14 14 Q. Because right now this is my only chance to
09:36:17 15 take your deposition in this case, and my goal is to
09:36:21 16 find out what your opinions are. Do you understand
09:36:23 17 that?

09:36:24 18 A. Yes.

09:36:24 19 Q. Okay. And if there is a mistake or you
09:36:27 20 realize there needs to be another correction, this is
09:36:28 21 the time to do it. You understand that?

09:36:30 22 A. Yes.

09:36:32 23 Q. Okay. You were retained back in February of
09:36:59 24 this year by the defense in this case; correct?

09:37:01 25 A. That's correct.

09:37:04 1 Q. Did you obtain any other students or
09:37:08 2 graduate students or anyone else to assist you with
09:37:10 3 your report?

09:37:12 4 A. No. This is entirely my own work.

09:37:15 5 Q. Okay. So no one assisted you at all.

09:37:18 6 A. That's correct.

09:37:19 7 Q. So when you --

09:37:23 8 Was there a -- a written agreement between
09:37:27 9 you and Blackwell Burke or 3M with respect to the
09:37:32 10 scope of your work?

09:37:32 11 A. I think it was primarily verbal.

09:37:34 12 Q. Okay. And do you know how 3M obtained your
09:37:43 13 information to contact you?

09:37:47 14 A. I do not know that.

09:37:48 15 Q. Okay. Do you know who contacted you from 3M
09:37:51 16 or Blackwell Burke?

09:37:52 17 A. Yes. It was a woman lawyer that --

09:37:56 18 I can't remember her first name off the top
09:37:59 19 of my head.

09:38:00 20 Q. What was her last name?

09:38:04 21 A. The name escapes me. I'm sorry, I can't --

09:38:08 22 I can't come up with that at the moment.

09:38:10 23 Q. Was it by e-mail or was it by telephone?

09:38:13 24 A. By phone contact.

09:38:14 25 Q. Okay. Are you still teaching classes at the

09:38:18 1 University of Minnesota?

09:38:19 2 A. Not regular classes. I'm still involved in

09:38:21 3 a summer short course.

09:38:23 4 Q. Is that the one this August?

09:38:25 5 A. Yes.

09:38:25 6 Q. Okay. With Professor -- with -- with Jim

09:38:28 7 Ho?

09:38:28 8 A. Yes.

09:38:30 9 Q. Okay. I take it you know Jim Ho personally.

09:38:32 10 A. I do.

09:38:32 11 Q. Okay. And you've actually written papers

09:38:36 12 with him.

09:38:36 13 A. One paper.

09:38:37 14 Q. Okay. When was the last time you talked to

09:38:41 15 Jim Ho?

09:38:41 16 A. I think that my last correspondence with him

09:38:44 17 was e-mail, probably sometime last fall.

09:38:47 18 Q. So you have not discussed this case with Jim

09:38:50 19 Ho.

09:38:50 20 A. I have not.

09:38:51 21 Q. Okay. Have you discussed this case with

09:38:52 22 anyone outside Blackwell Burke or 3M?

09:38:55 23 A. I have not.

09:38:56 24 Q. Now prior to conducting your work in this

09:39:45 25 case, did you prepare any protocols or methodologies

09:39:49 1 with respect to how you're going to attack the issue?

09:39:56 2 MR. GOSS: Object to form.

09:39:58 3 A. Your -- your question was prior to my --

09:40:01 4 Q. Well let's back up. I'll -- that's a good

09:40:03 5 objection. What was your --

09:40:05 6 What was the scope of your work in this

09:40:09 7 case?

09:40:09 8 A. The scope of my work was to address issues

09:40:11 9 involving filtration and particle movement primarily.

09:40:19 10 Q. Were those the only two issues?

09:40:21 11 A. Also did some work with temperature

09:40:24 12 measurements and velocity measurements.

09:40:29 13 Q. Anything else?

09:40:31 14 A. Those were the main -- main topic areas.

09:40:36 15 Q. And what are the minor topic areas?

09:40:39 16 A. Well there's -- there's aerosol science

09:40:45 17 which -- which underlies -- its principles underlie

09:40:50 18 particle motion and particle attachment/detachment,

09:40:53 19 aerosol measurement technology instrumentation.

09:40:58 20 Q. Anything else?

09:40:59 21 A. Also computational fluid mechanics and --

09:41:03 22 and the particle motion predicted by computational

09:41:07 23 fluid dynamics.

09:41:08 24 Q. Did you do any type of computational fluid

09:41:11 25 dynamics?

09:41:13 1 A. Not --
2 Q. Not in this case?
09:41:13 3 A. Not associated with this case.
09:41:15 4 Q. Okay. Have you ever done that in the past?
09:41:17 5 A. I have.
09:41:19 6 Q. And what program do you usually use?
09:41:19 7 A. I started back in the '80s actually writing
09:41:21 8 my own from -- from scratch, and more recently my
09:41:24 9 students have used a program called Fluent or --
09:41:31 10 trying to think of the more current name -- CFX.
09:41:35 11 Q. ANSYS?
09:41:36 12 A. Not --
13 Q. CFX.
09:41:37 14 A. CFX, yes.
09:41:37 15 Q. Okay. And is that the academic version of
09:41:48 16 Fluent and CFX?
09:41:49 17 A. They're available through our Supercomputer
09:41:51 18 Institute on campus, so I -- I -- I'm not sure of the
09:41:55 19 actual --
09:41:55 20 Q. Okay.
09:41:56 21 A. -- designations.
09:41:57 22 Q. Are students allowed to use that for
09:41:59 23 commercial activities?
09:42:00 24 A. Um --
09:42:01 25 Q. Do you know one way or the other?

09:42:03 1 A. Yes. The -- the license agreement is
09:42:05 2 different, but -- but yes, they are allowed to do
09:42:07 3 that.

09:42:07 4 Q. They're allowed to use its for commercial
09:42:10 5 purposes?

09:42:10 6 A. Yes.

09:42:10 7 Q. And for research?

09:42:12 8 A. Yes.

09:42:12 9 Q. And that's a license with -- between the
09:42:15 10 University of Minnesota and ANSYS?

09:42:16 11 A. Or -- or --
09:42:18 12 Yes. Or the -- or the parent company of the
09:42:21 13 software.

09:42:24 14 Q. Well you understand that Fluent and CFX is
09:42:26 15 owned by ANSYS. Do you understand that?

16 A. I -- I --

09:42:29 17 Q. A-N-S-Y-S.

09:42:29 18 A. If you say so. I'm not aware of the
09:42:32 19 details.

09:42:32 20 Q. When is the last time you used ANSYS?

09:42:34 21 A. I have never used ANSYS personally.

09:42:36 22 Q. When was the last time you performed a
09:42:38 23 computational fluid dynamic using a supercomputer?

09:42:41 24 A. Personally, it was probably 20 years ago.

09:42:46 25 Q. Okay. So you agree with me that you're not

09:42:48 1 up to date with respect to the current capabilities
09:42:51 2 with respect to ANSYS, Fluent, or CFX; correct?
09:42:57 3 A. I would not agree with that. I think I am
09:42:59 4 aware of the capabilities, I've just not done that
09:43:03 5 type of simulation work myself.
09:43:04 6 Q. Okay. So you're aware of the -- the code
09:43:14 7 that ANSYS uses with respect to CFX or Fluent?
09:43:18 8 A. I'm aware of the basic fundamental code that
09:43:23 9 began with Professor Patankar that then became Fluent,
09:43:26 10 that then became CFX.
09:43:29 11 Q. I understand that. But there are many
09:43:32 12 versions that have occurred since 20 years ago. You
09:43:34 13 understand that; correct?
09:43:34 14 A. Yes, I understand that.
09:43:36 15 Q. Okay. And you understand that the output is
09:43:38 16 usually only as good as the code; correct?
09:43:40 17 A. Well the -- the code itself and the user
09:43:44 18 inputs, including boundary conditions.
09:43:46 19 Q. But the code is very important.
09:43:48 20 A. The code has been well validated, yes.
09:43:51 21 Q. Okay. So it's the code that's validated;
09:43:53 22 correct?
09:43:53 23 A. Yes.
09:43:55 24 Q. Okay. So when -- when an engineer such as
09:44:00 25 yourself performs a CFD analysis and says it's

09:44:05 1 validated, it means that the code is validated;

09:44:08 2 correct?

09:44:08 3 MR. GOSS: Object to form.

09:44:09 4 A. I -- I would think that's what it would

09:44:11 5 represent.

09:44:11 6 Q. As someone in your field, as a doctor in

09:44:13 7 engineering that has done CFD, that is the term of art

09:44:17 8 used. When you say this -- this -- this CFD analysis

09:44:26 9 is validated, you mean the code is validated; correct?

09:44:28 10 MR. GOSS: Same objection.

09:44:29 11 MR. ASSAAD: Basis.

09:44:30 12 MR. GOSS: Vague.

09:44:32 13 Q. Do you understand my question?

09:44:33 14 A. I would -- I would respond and say that

09:44:36 15 the -- the code itself has been validated, but not any

09:44:39 16 particular results derived from that.

09:44:41 17 Q. But to validate a code --

09:44:49 18 The code is used for very complex questions

09:44:56 19 or analysis; correct?

09:44:58 20 A. It -- it can be.

09:44:59 21 Q. Okay. And if it's -- if it's validated for

09:45:02 22 a very complex model, then it would be validated for

09:45:08 23 less-complex models looking for the same type of

09:45:11 24 results; correct?

09:45:13 25 A. It really depends what type of validation is

09:45:17 1 performed and how that's done.

09:45:18 2 Q. Well what do you mean by that?

09:45:19 3 A. Some type of evaluation are -- is

09:45:23 4 corresponding -- or comparing results for fluid

09:45:27 5 mechanics flow measurements, velocity measurements to

09:45:31 6 experimental data, sometimes it's comparing one set of

09:45:34 7 -- one type of code to another -- another type of

09:45:37 8 code. So there's -- there are numerical comparisons

09:45:40 9 code to code and also comparisons with experiments.

09:45:42 10 Q. For example, if a code has been validated

09:45:49 11 for jet-engine combustion, by comparing the CFD

09:45:58 12 results to experimental data, you would agree that

09:46:04 13 that code now is validated for other types of jet-

09:46:08 14 engine combustion that are less complex than what the

09:46:10 15 validation scenario was provided.

09:46:18 16 A. As long as the same code is used, the same

09:46:21 17 subroutines. There are also issues; for example,

09:46:24 18 turbulent modeling and what parameters to put in

09:46:27 19 there.

09:46:27 20 Q. For turbulence, for flow, for combustion, if

09:46:30 21 it's been validated experimentally, the code is

09:46:33 22 validated for less-complex modeling; correct?

09:46:36 23 A. I would --

09:46:37 24 MR. GOSS: Object to form.

09:46:39 25 A. I would -- I would think it would be

24

09:46:40 1 accurate for less-complex flows.

09:46:42 2 Q. Okay. And so when an engineer such as

09:46:45 3 yourself that has used CFD analysis, when a code is

09:46:50 4 validated for a complex model, that means that less-

09:46:55 5 complex models could be used with the same CFD code

09:46:59 6 and obtain accurate results; correct?

09:47:01 7 A. Again, it depends on the user. If they're

09:47:05 8 using the code accurately and if the boundary

09:47:08 9 conditions are correct.

09:47:08 10 Q. Okay. I understand there's a boundary

09:47:10 11 question and whether or not you've input the

09:47:12 12 information correctly, but for the actual mathematical

09:47:14 13 results depend -- based on correct boundary

09:47:20 14 conditions, the computational analysis performed by

09:47:26 15 the CFD is validated; --

09:47:27 16 MR. GOSS: Object --

09:47:27 17 Q. -- correct?

09:47:28 18 MR. GOSS: Object to form.

09:47:29 19 A. I would -- I would not say validated.

09:47:31 20 Q. You would not say validated?

09:47:32 21 A. No.

09:47:32 22 Q. What would you say?

09:47:34 23 A. I would say it's most likely correct, but to

09:47:40 24 me validation means there's some other means of

09:47:43 25 checking the results.

25

09:47:44 1 Q. Okay. Well that's different. That's
09:47:45 2 verification; correct?
09:47:46 3 A. I -- I guess if we define that to be
09:47:50 4 verification, yes.
09:47:53 5 Q. Well you're the doctor in engineering. Do
09:47:53 6 you understand the difference between validation with
09:47:55 7 the CFD code and verification?
09:47:56 8 A. I'm not sure I -- I --
09:47:59 9 Q. You've never heard --
09:48:01 10 A. -- know the difference.
09:48:03 11 Q. You've never heard those terms?
09:48:04 12 A. I've heard the terms, but I'm not sure I
09:48:08 13 ever distinguished between the two.
09:48:15 14 Q. What do you teach your students with respect
09:48:18 15 to validation?
09:48:20 16 A. I really don't teach any -- any CFD in my
09:48:24 17 course work.
09:48:24 18 Q. Okay. Are you familiar with any other CFD
09:48:45 19 programs besides ANSYS?
09:48:49 20 A. I'm familiar with older ones I used to work
09:48:52 21 with; for example, Fluent and -- and the Patankar
09:48:56 22 original code.
09:48:57 23 Q. Okay. Are you familiar with STAR-CCM?
09:49:01 24 A. I am not.
09:49:01 25 Q. Have you heard of STAR-CCM?

09:49:04 1 A. I don't think I have.

09:49:09 2 Q. Okay. Now with respect to the issues that

09:49:13 3 you were asked to address by the defense in this case,

09:49:16 4 which is the filter particle movement with a

09:49:19 5 subcategory of aerosols, temperature increase,

09:49:25 6 velocity, and a little bit of computational fluid

09:49:31 7 analysis --

09:49:31 8 Is that the word you used?

09:49:33 9 A. I -- I believe that's the word I used.

09:49:35 10 Q. Okay. Is there anything else that you were

09:49:37 11 asked to do in this case?

09:49:39 12 A. Not that I can recollect.

09:49:42 13 Q. Okay. Prior to doing any work, did you

09:49:44 14 prepare any protocols or methodologies with respect to

09:49:49 15 your analysis of these issues?

09:49:53 16 A. Prior to being retained, is that the

09:49:55 17 question?

09:49:55 18 Q. No. After you had been retained but prior

09:49:58 19 to doing any testing or formulating your opinions.

09:50:03 20 A. Could you repeat question, please?

09:50:05 21 Q. Prior to formulating your opinions, did you

09:50:09 22 prepare any type of protocol or analysis on how you

09:50:20 23 would solve these issues?

09:50:23 24 A. I did some literature review and also

09:50:26 25 reviewed some material provided by counsel.

09:50:28 1 Q. And you -- and also what?

09:50:29 2 A. Provided by counsel.

09:50:30 3 Q. So you did a literature review -- review?

09:50:33 4 A. Yes.

09:50:33 5 Q. On your own?

09:50:34 6 A. Yes.

09:50:35 7 Q. Okay. And where did you do the literature

09:50:37 8 review?

09:50:38 9 A. On my laptop.

09:50:41 10 Q. Okay. Did you Google or did you go to some

09:50:45 11 sort of a --

09:50:45 12 A. I used -- used Google.

09:50:46 13 Q. Okay. And how long did you spend doing

09:50:47 14 literature review?

09:50:48 15 A. Probably not very long. Maybe -- maybe an

09:50:52 16 hour or so.

09:50:53 17 Q. One hour.

09:50:54 18 And what were your search terms, do you

09:50:56 19 recall?

09:50:56 20 A. I'm -- I'm trying to recall what I was

09:50:58 21 searching for at that time.

09:51:00 22 Q. Sitting here today, do you recall what you

09:51:02 23 were searching for at that time?

09:51:02 24 A. Not off the top of my head.

09:51:08 25 Q. Okay. Did you print any of the research

09:51:13 1 that you found?

09:51:16 2 A. I did not, because I don't have a printer at

09:51:19 3 home.

09:51:19 4 Q. Okay. Did you save any of them?

09:51:20 5 A. Yes, I did.

09:51:21 6 Q. Okay. And you --

09:51:23 7 And do you recall any of the articles that

09:51:25 8 you saved?

09:51:25 9 A. One of them was an article by Dr. Tsai and

09:51:30 10 Dr. Pui dealing with particle adhesion on surfaces.

09:51:36 11 Another one was a study done by some researchers in

09:51:42 12 the Netherlands on particle removal from surfaces.

09:51:47 13 Q. Anything else?

09:51:49 14 A. Those are the two that come to mind.

09:51:51 15 Q. All the articles that you saved, are they

09:51:54 16 listed in your report under Exhibit E?

09:52:05 17 A. They are -- I'm -- I'm --

09:52:07 18 They should be listed in the report

09:52:09 19 somewhere, whether -- which exhibit I -- I can't say.

09:52:11 20 Q. Okay.

09:52:13 21 A. They may be in the main -- main body of the

09:52:16 22 report, they may be in one of the exhibits, or maybe

09:52:19 23 both.

09:52:19 24 Q. Did you do any literature search with

09:52:21 25 respect to Bair Hugger?

09:52:21 1 A. I think I did, just to get a -- a look --
09:52:27 2 look at the -- essentially the user's manual.
09:52:29 3 Q. Did you look at anything else?
09:52:31 4 A. Regarding Bair Hugger, that -- that's all
09:52:33 5 I -- I was looking at.
09:52:35 6 Q. And the -- the three articles listed in
09:52:37 7 Exhibit E with respect to peer-reviewed literature
09:52:42 8 regarding the Bair Hugger, that was provided to you by
09:52:45 9 counsel; correct?
09:52:45 10 A. I would have to see what they are to respond
09:52:47 11 to that.
09:52:48 12 Q. The two Albrecht articles and the Reed
09:52:50 13 article.
09:52:51 14 A. I believe they were all provided by counsel.
09:52:53 15 Q. Okay. Any other documents or literature
09:52:55 16 provided by counsel?
09:52:56 17 A. Yes.
09:52:56 18 Q. What?
09:52:57 19 A. There was a report by -- filter testing that
09:53:02 20 3M had done.
09:53:03 21 Q. I'm talking about peer-reviewed literature.
09:53:06 22 A. Oh, peer-reviewed literature. Not that I
09:53:21 23 can think of off the top of my head.
24 Q. Okay.
09:53:28 25 A. Well there -- there was a -- I should --

09:53:31 1 There was a study that attempted to

09:53:35 2 correlate particle concentration versus biological

09:53:40 3 particle correlation.

09:53:40 4 Q. Is that the DeRue study?

09:53:43 5 A. That's not the first author I'm thinking of.

09:53:46 6 Q. Stocks?

09:53:46 7 A. Stocks, yes.

09:53:47 8 Q. Okay. When was that provided to you?

09:53:49 9 A. I think it was on Friday.

09:53:51 10 Q. This Friday?

09:53:52 11 A. (Nodding.)

09:53:54 12 Q. Okay. Have you reviewed any of the expert

09:53:55 13 reports, defense expert reports?

09:53:57 14 A. I have.

09:53:57 15 Q. Okay. Which ones?

09:54:03 16 A. I'm sorry, you said defense expert reports.

09:54:06 17 Q. Yes.

09:54:13 18 A. I have reviewed some of the plaintiffs'

09:54:16 19 reports.

09:54:17 20 Q. And I have a list in Exhibit E of what you

09:54:19 21 reviewed.

09:54:19 22 A. Yeah.

09:54:19 23 Q. I'm talking about defense experts.

09:54:26 24 A. Not that I can recall right -- right at the

09:54:28 25 moment.

31

09:54:28 1 Q. Okay. Do you know who --
09:54:30 2 Do you know Jim Ho is an expert in this
09:54:32 3 case?
09:54:32 4 A. Yes.
09:54:32 5 Q. He's a friend of yours; correct?
09:54:34 6 A. Yes.
09:54:34 7 Q. Did you review his report?
09:54:36 8 A. I have not seen his report.
09:54:38 9 Q. Do you know who John Abraham is?
09:54:40 10 A. Yes.
09:54:41 11 Q. Do you know him personally?
09:54:42 12 A. Yes.
09:54:43 13 Q. He was a student at the University of
09:54:45 14 Minnesota; correct?
09:54:45 15 A. Yes.
09:54:46 16 Q. Did you ever teach any of his classes?
09:54:48 17 A. I don't believe so.
09:54:49 18 Q. Okay. His focus was on heat transfer just
09:54:52 19 like you; correct?
09:54:53 20 A. That's what I've been told by counsel.
09:54:55 21 Q. Okay. When was the last time you spoke with
09:55:01 22 John Abraham?
09:55:05 23 A. Probably several years ago.
09:55:05 24 Q. Did you teach --
09:55:06 25 Do you recall teaching any of his classes?

32

09:55:08 1 A. No, I do not.

09:55:08 2 Q. Okay. Do you know if he was an A student, B

09:55:11 3 student, C student?

09:55:13 4 A. I -- I cannot recall that.

09:55:14 5 Q. Okay. Do you know who Gary Settles is?

09:55:17 6 A. I do.

09:55:18 7 Q. Personally?

09:55:19 8 A. I -- I know of him. I don't think I know

09:55:21 9 him personally.

09:55:22 10 Q. Have you read his report?

09:55:23 11 A. I have not.

09:55:24 12 Q. Okay. Do you know who Michael Keen is?

09:55:40 13 A. I do not.

09:55:41 14 Q. Okay. Have you read his report?

09:55:43 15 A. I have not.

09:55:47 16 Q. So do any of these names sound familiar with

09:55:52 17 respect to reports that you've seen: Abraham, Borak,

09:55:59 18 Hannenberg, Ho, Hulford, Hughes, Keen, Lampotang,

09:56:06 19 Mont, Settles, Ulatowski or Wenzel? Have you seen any

09:56:10 20 of -- any of their reports?

09:56:12 21 A. I have not seen any of those reports.

09:56:14 22 MR. ASSAAD: Okay. I'd like to mark your

09:56:51 23 report as --

09:56:54 24 THE REPORTER: Exhibit 1.

09:56:55 25 MR. ASSAAD: -- 1.

09:57:11 1 (Kuehn Exhibit 1 was marked for
09:57:13 2 identification.)
09:57:13 3 MR. ASSAAD: And I'd like to mark as Exhibit
09:57:19 4 2 the corrected version of Exhibit C.
09:57:32 5 (Kuehn Exhibit 2 was marked for
09:57:41 6 identification.)
09:57:41 7 BY MR. ASSAAD:
09:57:41 8 Q. Now Dr. Kuehn, I represent to you that this
09:57:43 9 is an exact copy of the report that was provided to us
09:57:47 10 by counsel, as well -- which includes the report
09:57:51 11 Exhibits A, B, C, D and E as Exhibit 1, and Exhibit 2
09:57:57 12 is the corrected Exhibit C. Do you agree with me?
09:58:00 13 A. Well I'll take your word for it.
09:58:02 14 Q. Well I don't want you to take your word --
09:58:05 15 my word for it. I want it on the record that you
09:58:08 16 agree with me that Exhibit 1 and 2 is your report,
09:58:09 17 unless your counsel wants to stipulate to that.
09:58:12 18 MR. GOSS: Do you want to just take a minute
09:58:13 19 to flip through it?
09:58:14 20 THE WITNESS: Yeah. I'd ask to take a look
09:58:16 21 to verify that.
09:58:17 22 MR. GOSS: I have no reason to think it's
09:58:19 23 not a bad -- that it's not an accurate copy, but if
09:58:22 24 you want him on the record, he might as well take a
09:58:24 25 look.

10:01:00 1 A. Okay. Yes, I agree this is an accurate
10:01:03 2 copy.

10:01:03 3 Q. For the record, Exhibit 1 and Exhibit 2 is
10:01:06 4 an accurate copy of your report, Exhibits A, B, C, D
10:01:12 5 and E of your report; correct? For Exhibit 1;
10:01:15 6 correct?

10:01:15 7 A. With Exhibit 2 being the corrected Exhibit
10:01:18 8 C.

10:01:18 9 Q. And Exhibit 2 is a corrected version of
10:01:21 10 Exhibit C that was provided to counsel on Friday, July
10:01:26 11 7th, 2017; correct?

10:01:27 12 A. I believe that's when it was provided.

10:01:30 13 Q. Okay.

10:01:30 14 A. I do -- I do not know that.

10:01:32 15 Q. Well when did you correct your report?

10:01:35 16 A. Friday.

10:01:35 17 Q. Okay. So it couldn't have been provided --
10:01:37 18 provided to us earlier than Friday; correct?

10:01:40 19 A. No. Right.

10:01:40 20 Q. Okay. And therefore I assume that you
10:01:43 21 recently reviewed your entire report; correct?

10:01:45 22 A. I -- I did look through it, yes.

10:01:47 23 Q. Are there any other corrections, sitting
10:01:51 24 here today, that you'd want to inform me before we get
10:01:52 25 into your report?

35

10:01:53 1 A. No.

10:01:53 2 Q. Okay. So you believe at this point in time

10:01:55 3 that the report reflects all the opinions you intend

10:01:59 4 to offer to the court and to the jury in this matter;

10:02:03 5 correct?

10:02:03 6 MR. GOSS: Object to form.

10:02:05 7 MR. ASSAAD: Basis.

10:02:06 8 MR. GOSS: Well, I think he left it open

10:02:09 9 that he may address new information as it becomes

10:02:14 10 available to him, as all the experts have.

10:02:22 11 MR. ASSAAD: So what's your objection?

10:02:24 12 MR. GOSS: Well, that you're closing the

10:02:28 13 door on him, and I think we intended to leave it open.

10:02:31 14 Q. Dr. Kuehn, would you agree with me that your

10:02:34 15 report contains all the opinions you intend to offer

10:02:37 16 to the court and to the jury in this matter that

10:02:41 17 you're aware of at this time on the day of your

10:02:43 18 deposition?

10:02:46 19 A. At this time of day, yes.

10:02:48 20 Q. Okay. Sitting here today at this point in

10:02:52 21 time, on July 10th, 2017 at 10:02 a.m., is there

10:02:57 22 anything that you want to add to your report or delete

10:03:00 23 from your report with respect to your opinions that

10:03:02 24 you will give in this case?

10:03:03 25 A. Not at this time.

36

10:03:04 1 Q. Okay. And you understand that I'm one of
10:03:08 2 the attorneys working on behalf of over 2,000 people
10:03:10 3 who have filed lawsuits alleging that they have been
10:03:13 4 harmed by the Bair Hugger. You understand that;
10:03:16 5 correct?

10:03:16 6 A. I have heard that, yes.

10:03:18 7 Q. Okay. And --

10:03:18 8 But you understand that; correct?

10:03:19 9 A. Yes.

10:03:20 10 Q. Okay. And you understand that the
10:03:21 11 plaintiffs have a legal right to understand the full
10:03:24 12 scope of your opinions in this case.

10:03:26 13 A. I believe so, yes.

10:03:27 14 Q. Okay. We also have the right to know all
10:03:30 15 the methodologies as to how you reached your opinions.
10:03:35 16 Do you understand that?

10:03:35 17 A. Yes.

10:03:36 18 Q. Now in reading your report, my understanding
10:03:56 19 is that your two main opinions are that the filter
10:04:03 20 that was selected for the Bair Hugger is appropriate
10:04:05 21 and that the Bair Hugger does not disrupt the airflow
10:04:08 22 in the operating room; is that correct?

10:04:10 23 A. Those are two main opinions, yes.

10:04:14 24 Q. Okay. And now looking at your report, you
10:04:21 25 reviewed the -- the reports of Dan Koenigshofer, Said

10:04:33 1 Elghobashi, Michael Buck, Yadin David, William Jarvis
10:04:41 2 and Michael Stonnington; correct?
10:04:42 3 A. That's correct.
10:04:43 4 Q. And your rebuttal to those expert reports of
10:04:47 5 the plaintiffs' experts are contained from page nine
10:04:58 6 to page 16; correct?
10:05:03 7 A. That's correct.
10:05:21 8 Q. And with respect to pages one through eight,
10:05:50 9 those were the issues that you were asked to address
10:05:53 10 by the defendant that we talked about earlier;
10:05:56 11 correct?
10:05:56 12 A. Including the top of page nine, yes.
10:05:59 13 Q. Okay. Do you recall receiving a subpoena in
10:06:19 14 this case?
10:06:19 15 A. Yes, I do.
10:06:21 16 Q. Okay. Did you produce all the documents
10:06:32 17 requested in the subpoena to Blackwell Burke?
10:06:39 18 A. If I could take a look at the subpoena
10:06:41 19 again, I could answer that.
10:06:52 20 (Kuehn Exhibit 3 was marked for
10:06:53 21 identification.)
10:06:54 22 BY MR. ASSAAD:
10:06:57 23 Q. Exhibit 3 is a subpoena issued on June 7th,
10:07:03 24 2017 to Dr. Kuehn in this case. Do you recall
10:07:09 25 receiving this subpoena?

10:07:10 1 A. Yes, I do.

10:07:15 2 Q. Now before we get to the subpoena, did you

10:07:17 3 create any notes, handwritten notes in this case?

10:07:21 4 A. I did.

10:07:22 5 Q. Okay. Were they notes that you created

10:07:29 6 while you were formulating your opinions?

10:07:31 7 A. Yes.

10:07:32 8 Q. Did you also create notes with regard --

10:07:35 9 with respect to conversations you had with counsel?

10:07:39 10 A. Yes.

10:07:40 11 Q. Okay. Are they on a separate notebook or on

10:07:43 12 the same notebook?

10:07:44 13 A. Same notebook.

10:07:45 14 Q. Okay. Do you have that notebook here with

10:07:47 15 you today?

10:07:47 16 A. I do not, no.

10:07:48 17 Q. Did you bring anything with you today?

10:07:50 18 A. I did not.

10:07:51 19 Q. Why not?

10:07:52 20 A. My impression was that the opposing attorney

10:07:57 21 would provide all the documents necessary.

10:08:01 22 Q. Well if -- if you have an article that may

10:08:05 23 support your opinion that you want to refer to,

10:08:08 24 wouldn't it be helpful if you had it here today when

10:08:11 25 you're expressing all your opinions today?

10:08:13 1 MR. GOSS: Object to form.

10:08:14 2 A. If I had to dig down into the details and --

10:08:18 3 and go back and look at where I obtained some of my

10:08:22 4 information, that would be helpful.

10:08:23 5 Q. Okay. So you agree with me it would be

10:08:29 6 helpful.

10:08:29 7 A. Yes.

10:08:30 8 Q. Okay. So it's clear that you have --

10:08:48 9 Do you have notes that you created on a

10:08:50 10 computer, like on a Word document or Excel sheet?

10:08:52 11 A. I do not.

10:08:53 12 Q. Okay. They're all handwritten notes --

10:08:56 13 A. Yeah.

10:08:57 14 Q. -- that you created?

10:08:58 15 Okay. Let's go through the subpoena. If

10:09:01 16 you go to page four of Exhibit 3, --

10:09:25 17 Page four.

10:09:30 18 A. Uh-huh.

10:09:31 19 Q. -- do you recall seeing this list of

10:09:33 20 documents to be produced, items one through 18?

10:09:37 21 A. I have.

10:09:38 22 Q. Did you go through all the list and produce

10:09:41 23 documents to your counsel?

10:09:42 24 A. I did.

10:09:43 25 Q. Okay. Did you produce your notes to your

40

10:09:46 1 counsel?
10:09:46 2 A. I did.
10:09:47 3 Q. You produced your invoices; correct?
10:09:50 4 A. Yes.
10:09:50 5 Q. Number one, "All documents reviewed by the
10:09:54 6 deponent in anticipation or in preparation for this
10:09:56 7 deposition." Did you produce those to your counselor?
10:09:59 8 A. I did.
10:10:00 9 Q. What documents were those?
10:10:02 10 A. Those include the -- some of the papers I
10:10:10 11 found online that I mentioned before, the books I used
10:10:14 12 as reference books, and also the -- the documents
10:10:22 13 provided by -- by counsel.
10:10:24 14 Q. Okay. If you go to Exhibit E of Exhibit 1,
10:10:32 15 which is a list of the materials considered, is there
10:10:50 16 anything on that list that you provided to -- that are
10:10:54 17 responsive to item number one of Exhibit 3 that is not
10:11:02 18 on this list?
10:11:06 19 A. Anything I provided that's not on the list,
10:11:08 20 is that the question?
10:11:08 21 Q. Yes.
10:11:37 22 A. I think that covers everything.
10:11:38 23 Q. Okay. So you haven't reviewed anything
10:11:42 24 besides what's on this list in preparation for your
10:11:48 25 deposition or anticipation of litigation.

41

10:11:51 1 A. I don't believe so.

10:11:52 2 Q. Okay.

10:11:53 3 MR. GOSS: I think he said --

10:11:56 4 MR. ASSAAD: I'm going to get there in a

10:11:56 5 second. We're going.

10:11:57 6 MR. GOSS: Okay.

10:11:57 7 Q. Besides the Stocks document; correct?

10:11:59 8 A. Yes.

10:12:00 9 Q. Okay. Any other documents that were

10:12:03 10 provided to you by counsel except the Stocks document

10:12:06 11 provided on Friday that you reviewed?

10:12:08 12 A. That's -- that's not on this list; --

10:12:11 13 Q. Yes.

10:12:11 14 A. -- correct?

10:12:12 15 That's the only one I can think of.

10:12:14 16 Q. Did --

10:12:14 17 Were there any documents that you reviewed

10:12:16 18 on Friday that's on this list?

10:12:21 19 A. I think there was a 3M data test report by

10:12:25 20 Winston Tan, which is about midway down on the first

10:12:28 21 page of Exhibit E.

10:12:29 22 Q. And that's the filter testing; correct?

10:12:30 23 A. Yes.

10:12:31 24 Q. Okay. Anything else?

10:12:32 25 A. Those were the two that we looked at on --

42

10:12:37 1 on Friday.

10:12:37 2 Q. Have you ever designed a filter?

10:12:40 3 A. I have not designed a filter from scratch,

10:12:43 4 no.

10:12:43 5 Q. Okay. Well when you say you haven't

10:13:11 6 designed a filter from scratch, have you done any type

10:13:14 7 of design of a filter?

10:13:15 8 A. Yes.

10:13:21 9 Q. What?

10:13:23 10 A. I helped design a device that would behave

10:13:26 11 as a filter but is not using normal fibrous media, but

10:13:30 12 the output would be the same or very similar to a

10:13:32 13 fibrous-media filter.

10:13:33 14 Q. What was that, a synthetic media?

10:13:35 15 A. It was actually using three parallel-stage

10:13:38 16 impactors that could be put into an ASHRAE 52.2 test

10:13:44 17 facility such that it could be replicated very

10:13:48 18 precisely, used in different laboratories to help

10:13:54 19 inter -- interlaboratory test results to assume they

10:13:57 20 were more uniform -- to make them more uniform.

10:14:00 21 Q. You need to speak up a bit for the camera

10:14:04 22 though.

10:14:04 23 A. Okay.

10:14:04 24 Q. Because I'm having trouble hearing you,

10:14:05 25 so --

43

10:14:06 1 A. Okay.

10:14:07 2 Q. Is that the only time you've ever designed a

10:14:10 3 filter-type like device?

10:14:11 4 A. That's my recollection, yes.

10:14:12 5 Q. Okay. With respect to number two, are there

10:14:26 6 any correspondence between you and anyone besides

10:14:29 7 Blackwell Burke or any of the attorneys from 3M?

10:14:33 8 A. No.

10:14:33 9 Q. Okay. How many pages of notes do you have?

10:14:40 10 A. Perhaps 30 or 40.

10:14:42 11 Q. Thirty or 40 pages. And you gave them to

10:14:46 12 Mr. Goss?

10:14:46 13 A. I did.

10:14:47 14 Q. When did you give it to him?

10:14:49 15 A. A few weeks ago.

10:14:50 16 Q. Okay. And out of those 30 or 40 pages, how

10:14:55 17 many pages dealt with actual conversations you had

10:14:57 18 with Mr. Goss?

10:14:59 19 A. Maybe one or two.

10:15:02 20 Q. One or two pages. Okay.

10:15:04 21 With respect to the conversations you had

10:15:11 22 with Mr. Goss, were there any facts that you relied

10:15:16 23 upon in formulating your opinions?

10:15:21 24 A. I would -- I would answer that as -- as no.

10:15:24 25 All -- all the facts I developed myself --

10:15:28 1 Q. Okay.

10:15:29 2 A. -- or -- or found in the literature or

10:15:31 3 other -- other materials provided to me.

10:15:33 4 Q. So all the facts that you relied upon are

10:15:36 5 contained in your report and in Exhibit E of

10:15:39 6 Exhibit 1.

10:15:40 7 A. That's correct.

10:15:40 8 Q. Okay. There's nothing that Mr. Goss --

10:15:44 9 You never asked Mr. Goss a question with

10:15:46 10 respect to a certain issue that you relied upon.

10:15:50 11 A. Not without getting some other documentation

10:15:52 12 that would satisfy my question.

10:15:53 13 Q. Such as?

10:15:55 14 Did you ask a question of Mr. Goss and he

10:15:57 15 provided you information through a document?

10:15:59 16 A. I asked about how a typical Bair Hugger

10:16:03 17 setup would -- would be used in a -- or how it would

10:16:06 18 be set up in an operating room, and I was provided

10:16:09 19 photographs of how -- how the Bair Hugger would be set

10:16:11 20 up in a typical patient.

10:16:12 21 Q. So he provided you photographs.

10:16:14 22 A. Yes.

10:16:14 23 Q. Okay. Where are those photographs? Are

10:16:16 24 they listed in Exhibit E?

10:16:17 25 A. No, they're not.

10:16:20 1 Q. Okay. Did you produce them back to Doc --

10:16:24 2 Mr. Goss in response to your exhibit -- or in response

10:16:28 3 to the subpoena, Exhibit 3?

10:16:29 4 A. They were provided me on Friday.

10:16:31 5 Q. They were provided to you on Friday.

10:16:34 6 A. On Friday, yes.

10:16:34 7 Q. So it's my understanding that you did -- you

10:16:36 8 did not know how a Bair Hugger was set up in an

10:16:38 9 operating room before this Friday, July 8th -- July

10:16:43 10 7th, 2017.

10:16:45 11 A. I wanted to have additional documentation

10:16:51 12 that I had reviewed prior to coming here today that I

10:16:54 13 could say, yes, I understand how a Bair Hugger is to

10:16:56 14 be set up properly in an operating room.

10:16:58 15 Q. And how many pictures did he send over to

10:17:01 16 you?

10:17:01 17 A. Approximately six.

10:17:02 18 Q. Okay. And where were those pictures taken?

10:17:04 19 A. I do not know.

10:17:05 20 MR. GOSS: These are the draping pictures

10:17:09 21 that Dr. Mont used in his Science Day presentation,

10:17:14 22 and we can send them over.

10:17:16 23 MR. ASSAAD: Can you please send over the

10:17:17 24 notes as well?

10:17:19 25 MR. GOSS: I will review that with the team.

10:17:21 1 That call was made when I was out of the country.

10:17:26 2 Q. Did you rely on those notes to prepare

10:17:28 3 your -- your report?

10:17:30 4 A. I -- I did the background work in the -- in

10:17:34 5 the notes and then used those to prepare the report,

10:17:38 6 yes.

10:17:38 7 Q. Okay. Now your report is -- your report is

10:17:41 8 only 16 pages; correct?

10:17:50 9 A. Well I should say the report and exhibits.

10:17:53 10 Q. Okay. And you have 30 pages of notes at

10:17:58 11 least.

10:17:58 12 A. That's my approximation.

10:18:00 13 Q. Was it on an engineering notebook pad or was

10:18:03 14 it a regular like legal pad?

10:18:06 15 A. It's on a bound engineering notebook.

10:18:09 16 Q. Okay. Did you make any marks on any of the

10:18:27 17 documents you reviewed in Exhibit E of Exhibit 1?

10:18:31 18 A. Some of the documents provided by counsel I

10:18:34 19 did.

10:18:34 20 Q. Okay. Did you provide those to your

10:18:37 21 counsel?

10:18:37 22 A. I did.

10:18:38 23 Q. Okay. By the way, are you being represented

10:18:40 24 by Blackwell Burke today?

10:18:43 25 A. My understanding is I'm here serving as an

10:18:46 1 expert witness on the case and not -- not being
10:18:52 2 personally represented.

10:18:52 3 Q. Okay. So now we know you have notes on --

10:19:00 4 with respect to the item number four of Exhibit 3.

10:19:03 5 There's notes -- there's handwritten notes on

10:19:05 6 documents that you reviewed that you provided to

10:19:06 7 counsel; correct?

10:19:07 8 A. That's correct.

10:19:08 9 Q. With respect to item number five, do you

10:19:16 10 have any documents responsive to number five?

10:19:19 11 A. You're referring back to the subpoena?

10:19:20 12 Q. Yes.

10:19:48 13 A. The -- the two papers I referred to earlier

10:19:51 14 by Tsai and the -- the Dutch researchers, I have an

10:20:03 15 electronic form on my computer. I do not recall if I

10:20:08 16 have provided copies to counsel of those.

10:20:13 17 Q. With respect to six and seven, "A list of

10:20:18 18 all books" -- well strike that.

10:20:21 19 With respect to item six of Exhibit 3, "A

10:20:23 20 list of all books, treatises, and arti -- articles

10:20:26 21 authored or co-authored by the deponent," that would

10:20:29 22 be in your CV; correct?

10:20:31 23 A. That's correct.

10:20:31 24 Q. Okay. With respect to number seven, "A list

10:20:34 25 of all books, treatises, articles, publications, or

48

10:20:38 1 materials which the deponent considers authoritative
10:20:42 2 with regard to the deponent's opinions in this case, "
10:20:45 3 would that be in Exhibit E of your report?
10:20:47 4 A. I'm -- I'm sorry, I'm trying to follow
10:20:50 5 where -- where you are.
10:20:51 6 Q. Number seven.
10:20:52 7 A. On which --
10:20:53 8 Q. Page four of Exhibit 3, number seven. I'm
10:21:00 9 going down the list.
10:21:09 10 A. Okay, number seven. I provided everything
10:21:21 11 that I used in preparing my -- my report, yes.
10:21:24 12 Q. And you consider all those items
10:21:26 13 authoritative.
10:21:26 14 A. Yes.
10:21:27 15 Q. Do you consider the ASHRAE manuals and --
10:21:30 16 and papers authoritative?
10:21:31 17 A. As engineering best practice, yes.
10:21:36 18 Q. So you consider it authoritative.
10:21:37 19 A. Yes.
10:21:38 20 Q. Number 10 states, "An itemized list of time,
10:21:49 21 charges, and expenses for services or opinions
10:21:52 22 rendered in this case, including an itemization for
10:21:55 23 said services performed by any person employed by the
10:21:58 24 deponent in this case." Did you produce all those to
10:22:02 25 your -- to counsel?

10:22:03 1 A. As of early June I did, yes.

10:22:05 2 Q. Okay.

10:22:06 3 A. Not since then.

10:22:22 4 (Kuehn Exhibit 4 was marked for
5 identification.)

6 BY MR. ASSAAD:

10:22:26 7 Q. Exhibit 4 I represent are three invoices

10:22:29 8 provided to the plaintiffs in response to our subpoena

10:22:35 9 to you. Do you recognize these three pages?

10:22:59 10 A. Yes, I do.

10:23:00 11 Q. You guess you do?

10:23:01 12 A. Yes, I do.

10:23:03 13 Q. Oh, yes, you do. I'm sorry. I thought you

10:23:06 14 said "I guess I do."

10:23:07 15 Okay. Are you aware that out of all the

10:23:09 16 documents that we have been talk -- discussing, that

10:23:14 17 these are the only three pages provided by your

10:23:17 18 counsel in response to the subpoena to plaintiffs?

10:23:19 19 A. I have no idea of that.

10:23:21 20 Q. Okay. All right. You mentioned you spent

10:23:32 21 an hour doing independent research. Where is that on

10:23:38 22 any of these invoices that you did in the beginning of

10:23:41 23 the case?

10:23:52 24 A. I think I submitted an invoice for the month

10:23:57 25 of March, which is not included in here, which may

10:24:02 1 have in -- included that. Or perhaps when I'm saying
10:24:06 2 "Continue work on expert report," that may have
10:24:08 3 included some -- some online searching for
10:24:11 4 documents --
10:24:11 5 Q. Okay.
10:24:11 6 A. -- in the -- in the April invoice.
10:24:28 7 Q. So these are not all the invoices you -- you
10:24:41 8 have created in this case.
10:24:43 9 A. I recall submitting one for the month of
10:24:46 10 March, which I do not see here.
10:24:48 11 Q. Do you remember how many hours that was?
10:24:49 12 A. I do not remember off the top of my head.
10:24:51 13 Q. Okay. And the last invoice you have is
10:24:55 14 invoice date of July 12th for the month of June;
10:24:58 15 correct?
10:24:58 16 A. I think that may be a -- an incorrect date.
10:25:06 17 That may have been June 12th --
10:25:07 18 Q. Okay.
10:25:09 19 A. -- instead of --
10:25:10 20 Yeah. If you look up in the first line it
10:25:12 21 says 6/1/2017.
10:25:15 22 Q. Okay. Have you provided any other invoices
10:25:20 23 since then?
10:25:20 24 A. I have not.
10:25:21 25 Q. How many hours have you billed for the month

10:25:25 1 of July, to your recollection?

10:25:28 2 A. I have not billed anything since this.

10:25:29 3 Q. How many hours have you worked on this case

10:25:31 4 in the month of July?

10:25:32 5 A. I would estimate maybe 15 to 20.

10:25:36 6 Q. Fifteen. And that was in the preparation of

10:25:39 7 your deposition; correct?

10:25:40 8 A. I don't recall when I actually submitted

10:25:44 9 the -- the expert report, if that included July or if

10:25:47 10 that was done in June. I do not know if the July time

10:25:51 11 included any expert-report preparation or if it's

10:25:55 12 simply preparing for the deposition.

10:25:56 13 Q. Well I state for the record that your

10:25:58 14 expert re --

10:25:59 15 Well if you look at Exhibit 1, your expert

10:26:01 16 report was signed on June 1st, 2017.

10:26:03 17 A. Okay. Then -- then I did not spend time on

10:26:08 18 the expert report in July. I was simply preparing for

10:26:09 19 the deposition.

10:26:09 20 Q. Okay. So the whole time in July, all the

10:26:12 21 hours you worked on this case and will submit to

10:26:15 22 defense counsel was in preparation of your deposition;

10:26:18 23 correct?

10:26:18 24 A. And also reviewing the report and -- yes.

10:26:22 25 Q. Your report.

10:26:23 1 A. Yes.

10:26:25 2 Q. You haven't read any other reports in

10:26:29 3 preparation for this deposition; correct?

10:26:29 4 A. Yes. I --

10:26:30 5 Well no -- no defense reports.

10:26:33 6 Q. You reviewed some of the plaintiffs'

10:26:35 7 reports?

10:26:35 8 A. Yes.

10:26:35 9 Q. Whose?

10:26:36 10 A. Koenigshofer's, I don't remember when I did

10:26:42 11 that, Buck, Elghobashi. Those are the main three.

10:26:47 12 Also reviewed a few others.

10:26:50 13 MR. GOSS: Are you asking just in July?

10:26:53 14 MR. ASSAAD: In preparation for today's

10:26:55 15 deposition.

10:26:56 16 A. I think there's a total of maybe six or

10:27:00 17 seven I looked at altogether.

10:27:02 18 Q. Do you know Dr. Elghobashi?

10:27:04 19 A. I've heard of him. I do not know him.

10:27:08 20 Q. Okay. Have you ever heard of the Elghobashi

10:27:10 21 Map?

10:27:11 22 A. I have not heard of that.

10:27:13 23 Q. Okay. Do you know what coupling is with

10:27:15 24 respect to particle movement?

10:27:16 25 A. I -- I would say I -- prob --

53

10:27:24 1 Probably not.

10:27:24 2 Q. Okay. Do you know who Lagrange is?

10:27:28 3 A. Yes.

10:27:30 4 Q. And Mueller?

10:27:30 5 A. Yes.

10:27:30 6 Q. Have you ever heard the term boussinesq?

10:27:34 7 A. Yes.

10:27:34 8 Q. What's your understand -- what's your

10:27:36 9 understanding of boussinesq?

10:27:37 10 A. It's a simplified approximation for -- for

10:27:40 11 fluid mechanics.

10:27:41 12 Q. With respect to what?

10:27:42 13 A. I believe it's assuming the fluid properties

10:27:48 14 are constant.

10:27:49 15 Q. Excuse me?

10:27:50 16 A. Assuming the fluid properties are constant.

10:27:52 17 Q. What property of fluids?

10:27:54 18 A. I think it's both density and viscosity.

10:28:00 19 Q. When is the last time you used the

10:28:05 20 boussinesq approach in solving problems?

10:28:07 21 A. It's probably a long time ago, maybe 20 --

10:28:09 22 20 years ago.

10:28:10 23 Q. Do you know the limitations of the

10:28:12 24 boussinesq approach?

10:28:14 25 A. I know they're not valid when there's large

10:28:17 1 temperature gradients, which -- which changes both
10:28:19 2 density and viscosity.

10:28:20 3 Q. What would you consider a large temperature
10:28:23 4 gradient?

10:28:23 5 A. In -- in -- mostly in -- in liquids, because
10:28:27 6 the viscosity is much stronger a function of
10:28:30 7 temperature than it is of, say, gases.

10:28:32 8 Q. I understand. But what would you consider a
10:28:34 9 large temperature gradient?

10:28:36 10 A. In liquids, for example in water, maybe
10:28:39 11 something more than 20 or 30 degrees Fahrenheit.

10:28:41 12 Q. How about gas?

10:28:43 13 A. Gas is probably much higher temperature
10:28:48 14 because the viscosity and density are not nearly as --
10:28:51 15 as temperature-dependent. I would say maybe 50 to a
10:28:55 16 hundred.

10:28:56 17 Q. Okay. Is that a guess or is that based
10:29:02 18 on --

10:29:02 19 A. That's --

10:29:03 20 Q. -- any document or research that you've
10:29:06 21 done?

10:29:06 22 A. That's -- that's an estimate based on my
10:29:11 23 experience.

10:29:11 24 Q. Can you point me to a literature or
10:29:13 25 peer-reviewed article that supports that statement?

55

10:29:15 1 A. I could probably find documentation of that
10:29:22 2 in a -- a good fluid mechanics textbook.
10:29:25 3 Q. Okay.
10:29:39 4 MR. GOSS: We've been going about an hour.
10:29:41 5 Do you want to take a quick break?
10:29:43 6 MR. ASSAAD: Give me five minutes.
10:29:45 7 MR. GOSS: No problem.
10:29:47 8 Q. Do you know Dan Koenigshofer?
10:29:49 9 A. I do not.
10:29:50 10 Q. Do you know Michael Buck?
10:29:52 11 A. I may have run across him at the university,
10:29:55 12 but no, I really don't know him.
10:29:57 13 Q. He works with Andy Streifel. Do you know
10:30:01 14 him?
10:30:03 15 A. I do know Andy, yes.
10:30:03 16 Q. Do you know him very well?
10:30:04 17 A. Reasonably well. We've worked together from
10:30:06 18 time to time in the past.
10:30:07 19 Q. Okay. With respect to using the boussinesq
10:30:23 20 approach, are you aware of what ANSYS, Fluent or CFX
10:30:29 21 states in their manuals with respect to using that
10:30:32 22 approach?
10:30:32 23 A. I do not know that.
10:30:33 24 Q. Okay. Would you be surprised that they
10:30:36 25 consider a gradient greater than three or four degrees

10:30:40 1 Celsius with respect to using particle flow, that that
10:30:43 2 would be too large of a gradient with respect to using
10:30:47 3 the boussinesq approach?

10:30:49 4 A. Based on my experience, that seems to be
10:30:51 5 overly restrictive.

10:30:53 6 Q. Okay. When is the last --

10:30:56 7 Well your experience has been over 25 years
10:30:59 8 using the boussinesq approach; correct?

10:31:01 9 A. Yes.

10:31:04 10 Q. With respect to item number nine on Exhibit
10:31:11 11 3, the subpoena, there's no engagement agreement
10:31:15 12 between you and Blackwell Burke or 3M; correct?

10:31:18 13 A. Can you define "engagement agreement?"

10:31:22 14 Q. No written document or contract between you
10:31:24 15 two.

10:31:24 16 A. It's -- it's a verbal agreement.

10:31:26 17 Q. Okay. Do you have any correspondence at all
10:31:33 18 with either defense counsel or anyone else in this
10:31:36 19 case? And that includes e-mails.

10:31:40 20 A. There are some e-mail correspondence between
10:31:41 21 myself and counsel.

10:31:43 22 Q. Okay. But no one else besides counsel.

10:31:47 23 A. No.

10:31:47 24 Q. Besides the six photographs that were
10:31:57 25 provided to you on Friday, five or six photographs,

10:31:59 1 any other photographs provided to you?

10:32:01 2 A. Not other than the ones that are included in

10:32:07 3 one of my exhibits.

10:32:08 4 Q. Okay. Who took those pictures in the

10:32:11 5 exhibits?

10:32:11 6 A. Oh, it was either Peter or -- or Vinita.

10:32:16 7 Q. Who is Vinita?

10:32:17 8 A. Vinita is one of the lawyers in Blackwell

10:32:20 9 Burke's office.

10:32:21 10 MR. GOSS: She's an associate in my office.

10:32:23 11 MR. ASSAAD: Okay.

10:32:23 12 MR. GOSS: She will be here later, after

10:32:26 13 lunch.

10:32:26 14 MR. ASSAAD: Okay.

10:32:27 15 Q. Was anyone else in the room in Exhibit D?

10:32:30 16 A. No, just the three of us.

10:32:30 17 Q. Okay. Where -- where did that Exhibit D,

10:32:32 18 where did that occur?

10:32:34 19 A. That occurred in the 3M laboratory.

10:32:36 20 Q. Okay. So it happened in a 3M laboratory

10:32:38 21 in --

10:32:38 22 A. Yes.

10:32:39 23 Q. -- St. Paul?

10:32:39 24 A. Yes.

10:32:43 25 Q. Okay. I take it you had no communications

10:32:48 1 with any other experts in this case, defense experts.

10:32:53 2 A. I have not communicated with anybody other

10:32:55 3 than defense -- other than counsel I should say.

10:32:59 4 Q. Is there any agreements for you to perform

10:33:01 5 any other work in this case besides formulating your

10:33:04 6 opinions that are outlined in Exhibit 1 and 2?

10:33:10 7 A. I would anticipate as additional information

10:33:13 8 becomes available I would be asked to perform

10:33:15 9 additional services.

10:33:17 10 Q. Such as what additional information?

10:33:19 11 A. Perhaps reviewing additional depositions or

10:33:21 12 other -- other documents that may come forward.

10:33:34 13 Q. Are you aware that general causation

10:33:37 14 discovery is closed in this case?

10:33:40 15 Do you know what that means?

10:33:41 16 A. I -- I'm not -- not aware of that.

10:33:44 17 Q. You know what general --

10:33:45 18 You know what discovery is; correct?

10:33:46 19 A. Yes.

10:33:47 20 Q. You're familiar with lawsuits; correct?

10:33:48 21 A. Yes.

10:33:50 22 Q. Have you ever been sued yourself?

10:33:51 23 A. No.

10:33:51 24 Q. Have you ever sued anybody?

10:33:52 25 A. No.

10:33:53 1 Q. Okay. Discovery has been closed in this
10:33:56 2 case for a few months now; correct? Are you aware of
10:33:58 3 that?

10:33:59 4 A. I -- I'm not aware of the legal terms, no.

10:34:01 5 Q. Okay. Is there anything specific with
10:34:11 6 respect to patients that would change your opinions in
10:34:14 7 this case?

10:34:18 8 A. Could you re -- repeat the question?

10:34:21 9 Q. Well you talked about getting new
10:34:22 10 information, you know, you might ask to be -- offered
10:34:27 11 some potential new information, so I'm trying to
10:34:27 12 figure out what type of information might affect your
10:34:30 13 opinions. So my first question is: Anything specific
10:34:34 14 to a patient's medical records that might affect or
10:34:37 15 change your opinions in this case?

10:34:38 16 A. I -- I'm going under the assumption that the
10:34:41 17 only additional information provided would be, for
10:34:44 18 example, a deposition from someone.

10:34:45 19 Q. Okay. What in a deposition might affect
10:34:49 20 your opinions in this case?

10:34:50 21 A. It's difficult for me to say without reading
10:34:54 22 the deposition.

10:34:54 23 Q. Okay. Do you feel that you have all the
10:35:02 24 information necessary to support your opinions in this
10:35:09 25 case?

60

10:35:10 1 A. I think I do.

10:35:11 2 Q. Okay. You -- you agree that the good

10:35:33 3 engineering approach in attacking an issue is to study

10:35:37 4 the issue extensively; correct?

10:35:43 5 A. Engineers always have restrictions on time

10:35:46 6 and resources, so one does the best one can under the

10:35:50 7 existing circumstances.

10:35:51 8 Q. Did you have any restrictions on your time

10:35:53 9 by 3M or Blackwell Burke?

10:35:55 10 A. I did not.

10:35:57 11 Q. So you could have spent as much time as you

10:35:59 12 want or you felt necessary to research the issues in

10:36:02 13 this case; correct?

10:36:03 14 A. That's correct.

10:36:04 15 Q. Okay. Could you -- would --

10:36:06 16 Could you have asked a graduate student or

10:36:09 17 a -- a researcher to assist you in this case?

10:36:11 18 A. I didn't think that was appropriate.

10:36:13 19 Q. Why not?

10:36:14 20 A. Because I was the one retained as an expert

10:36:16 21 witness and not a -- not a graduate student.

10:36:18 22 Q. I understand that. But you've also written

10:36:21 23 many papers and used graduate students to help you do

10:36:24 24 the research; correct?

10:36:25 25 A. Yes, but that's not a litigation process.

10:36:27 1 Q. But you rely on -- on your graduate
10:36:29 2 students; correct?
10:36:30 3 A. For the research they do in the laboratory,
10:36:31 4 yes.
10:36:31 5 Q. Or to do any type of research review;
10:36:35 6 correct?
10:36:35 7 A. Under my direction, yes.
10:36:38 8 Q. For example, when you attack a new problem,
10:36:41 9 you want to review and obtain all the peer-reviewed
10:36:45 10 literature, relevant literature on that issue to see
10:36:47 11 what other people have done; correct?
10:36:49 12 A. As much as is reasonably possible, yes.
10:36:52 13 Q. Did you do that in this case?
10:36:54 14 A. Other than some keyword searches, I did not
10:36:59 15 do a very exhaustive search, no.
10:37:00 16 Q. You relied on what 3M provided you; correct?
10:37:03 17 A. That, and some of the work -- some of the
10:37:05 18 searching I did on my own.
10:37:07 19 Q. Well what we talked about today, those two
10:37:09 20 articles; correct?
10:37:10 21 A. Those were the two that I thought were the
10:37:12 22 most relevant to support my opinions.
10:37:14 23 Q. What other articles did you think that were
10:37:16 24 relevant but not the most relevant?
10:37:18 25 A. There were a number of articles on particle

10:37:21 1 deposition, particle removal, filtration that I didn't
10:37:25 2 think were as relevant, so I did not include them.

10:37:27 3 Q. With respect to the use of the Bair Hugger
10:37:29 4 and its effect on the environment, did you review any
10:37:32 5 articles of that nature?

10:37:33 6 A. I don't believe I did, other than what was
10:37:37 7 provided.

10:37:37 8 Q. Okay. You relied on 3M to provide you those
10:37:40 9 articles; correct?

10:37:40 10 A. I relied on counsel to provide the articles.

10:37:43 11 Q. Well counsel represents 3M in this case.

10:37:45 12 You understand that; correct?

10:37:46 13 A. Yes.

10:37:48 14 Q. Okay. And you would expect that, being
10:37:51 15 retained as an expert in this case and being a
10:37:54 16 professor at the University of Minnesota, that 3M
10:37:57 17 would provide you with all the information necessary
10:37:59 18 to formulate your opinions; correct?

10:38:03 19 A. I --

10:38:04 20 That -- that's not the case. They provided
10:38:05 21 some of the material and I obtained other material
10:38:08 22 myself, some background material.

10:38:10 23 Q. Yeah. But if they were aware of information
10:38:12 24 that might be relevant to your opinions or could
10:38:13 25 affect your opinions, you'd expect 3M to provide you

10:38:16 1 that information; correct?

10:38:17 2 A. I would expect that to be the case, yes.

10:38:19 3 Q. Okay. Because that would be --

10:38:23 4 I mean for you to be objective, you want to

10:38:26 5 know the good and the bad with respect to an issue

10:38:29 6 that is known in the scientific community; correct?

10:38:32 7 A. You want to know as much as possible, yes.

10:38:35 8 Q. To be objective.

10:38:36 9 A. Yes.

10:38:39 10 Q. Okay. Because you're not here to be an

10:38:42 11 advocate, you're here to be objective as an engineer

10:38:44 12 and pretty much black and white on the science;

10:38:47 13 correct?

10:38:47 14 A. I am --

10:38:48 15 MR. GOSS: Object to form.

10:38:49 16 A. -- here -- I'm here to defend the positions

10:38:51 17 that I have set forth.

10:38:53 18 Q. You're here to defend 3M's positions;

10:38:57 19 correct?

10:38:57 20 MR. GOSS: Object to form.

10:38:58 21 Q. Correct?

10:38:59 22 A. These are my positions I have put forth.

10:39:03 23 MR. ASSAAD: I think it's time for a break.

10:39:05 24 THE REPORTER: Off the record, please.

10:50:12 25 (Recess taken.)

10:50:12 1 BY MR. ASSAAD:

10:50:16 2 Q. Dr. Kuehn, did you meet with anyone at 3M to

10:50:22 3 discuss this issue?

10:50:24 4 A. No, I did not.

10:50:26 5 Q. So you never met with like Michelle Stevens,

10:50:29 6 Al Van Duren, any one of --

10:50:31 7 Any of those names sound familiar?

10:50:33 8 A. No.

10:50:35 9 Q. Okay. Going back to Exhibit 4, my

10:50:45 10 understanding is that you believe there's a March

10:50:49 11 invoice and a May invoice that is not reflected in

10:50:53 12 Exhibit 4; correct?

10:50:54 13 A. That's my recollection. I thought I

10:50:56 14 submitted invoices every month up until the 1st of

10:51:00 15 June.

10:51:00 16 Q. Okay. Besides --

10:51:10 17 If you look at page three, besides your work

10:51:12 18 on June 1st, 2017 for one hour, do you recall any

10:51:16 19 other work you performed on this case in the month of

10:51:19 20 June?

10:51:20 21 A. Yes, yes, there was work done after this. I

10:51:26 22 believe the expert report, as -- as you mentioned, was

10:51:29 23 submitted about June 1st, so I was told to submit all

10:51:32 24 my invoices, all my time up to that date, which I did.

10:51:35 25 Q. Okay. My question is: Was there any other

65

10:51:38 1 work you performed on this case in the whole entire
10:51:41 2 month of June?

10:51:41 3 A. After June 1st, yes.

10:51:43 4 Q. What work?

10:51:44 5 A. I would say probably reading -- reading

10:51:50 6 depositions that were provided by counsel.

10:51:54 7 Q. My understanding is that the deposition of

10:51:57 8 Jim Ho was provided to you on Friday; correct?

10:52:00 9 A. That's correct.

10:52:00 10 Q. Okay. So you didn't do that work in June;

10:52:03 11 correct?

10:52:03 12 A. No.

10:52:03 13 Q. Okay. I'm asking for the month of June, --

10:52:05 14 A. Yes.

10:52:06 15 Q. -- any other work that was performed on this

10:52:08 16 case.

10:52:08 17 A. I -- I can't recall specifics off the top of

10:52:13 18 my head.

10:52:13 19 Q. Okay. What other depositions besides Jim

10:52:17 20 Ho's deposition was provided to you?

10:52:19 21 A. Koenigshofer's and Zgoda's, Karl Zgoda,

10:52:32 22 Elghobashi's. Those are the ones that come to mind.

10:52:37 23 Q. Okay. And also Mr. Crowder?

10:52:38 24 A. I think I reviewed his expert report, but I

10:52:43 25 don't think I recall seeing his --

10:52:44 1 Q. Well he's not an expert in this case. He
10:52:48 2 was deposed. He's the person with Pentair.
10:52:49 3 A. Then -- then I must have seen his -- his
10:52:52 4 deposition.
10:52:56 5 Q. I believe you put it -- you put it down on
10:52:58 6 Exhibit E of Exhibit 1.
10:53:00 7 A. Okay. Then -- then that must be correct.
10:53:03 8 Q. Okay. So when did you receive Dr.
10:53:08 9 Elghobashi's deposition?
10:53:10 10 A. I can't say for sure. Probably maybe six
10:53:18 11 weeks ago.
10:53:21 12 Q. Okay. Well his deposition was taken on June
10:53:28 13 15th, --
10:53:29 14 A. Okay.
10:53:29 15 Q. -- so it had to have been after that.
10:53:31 16 A. Okay.
10:53:32 17 Q. Okay. You said you also received Dan
10:53:36 18 Koenigshofer's deposition; correct?
10:53:38 19 A. Yes.
10:53:40 20 Q. And did you receive Michael Buck's
10:53:43 21 deposition?
10:53:43 22 A. Yes.
10:53:44 23 Q. Okay. Did you receive Dr. Ulatowski's
10:53:52 24 deposition?
10:53:52 25 A. No.

10:53:52 1 Q. Did you read the entire deposition of Dr.
10:53:56 2 Elghobashi?
10:53:56 3 A. I have not read the entire deposition, no.
10:53:58 4 Q. Have you read the entire deposition of -- of
10:54:01 5 Dan Koenigshofer?
10:54:02 6 A. Yes, I have.
10:54:03 7 Q. Have you read the entire deposition of
10:54:05 8 Michael Buck?
10:54:06 9 A. Yes, I have.
10:54:06 10 Q. Have you read the entire deposition of Jim
10:54:09 11 Ho?
10:54:09 12 A. Yes, I have.
10:54:10 13 Q. Were there any parts of the deposition that
10:54:13 14 you were asked to review?
10:54:16 15 A. Not specifically. I was asked --
10:54:18 16 Well, I took it upon myself to read the
10:54:20 17 entire deposition of those -- those four.
10:54:22 18 Q. Okay. And I assume you've read the entire
10:54:29 19 reports of Dr. Elghobashi, Dr. David, Dr. Stonnington
10:54:36 20 and Dr. Samet; correct?
10:54:39 21 A. There were a number of reports given to me
10:54:42 22 several months ago, so I -- I can't recall exactly
10:54:45 23 which ones.
10:54:46 24 Q. Okay.
10:54:46 25 A. But those -- those sound correct.

10:54:48 1 Q. When you received the report, did you read
10:54:50 2 the entire report?

10:54:51 3 A. Reviewed, at least -- at least glanced
10:54:55 4 through the entire report, yes.

10:54:56 5 Q. When you use the term "glance," what -- what
10:54:59 6 does "glance" mean to you?

10:55:01 7 A. Take a -- a first look through all of it,
10:55:04 8 and then some of them I went back and -- and read in
10:55:06 9 more detail.

10:55:07 10 Q. Okay. And -- and are the hours spent with
10:55:13 11 respect to your work on Exhibit 4 accurate?

10:55:16 12 A. With -- with the exception of the perhaps
10:55:21 13 two missing invoices, yes.

10:55:23 14 Q. I understand that. But when you say you
10:55:28 15 spent one hour doing something, it was actually an
10:55:31 16 hour and not two hours, three hours.

10:55:33 17 A. I try to be very -- very correct about that.

10:55:35 18 Q. Because that's what engineers do, they -- we
10:55:38 19 try to be accurate; correct?

10:55:39 20 A. That's correct.

10:55:40 21 Q. Okay. You're a member the American Society
10:55:46 22 of Mechanical Engineers; correct?

10:55:46 23 A. Yes.

10:55:47 24 Q. And you're also a member of ASHRAE; correct?

10:55:49 25 A. Yes.

10:55:50 1 Q. Okay. So just to be clear, on page two of
10:55:56 2 Exhibit 4, on April 8th it states that you spent one
10:56:09 3 hour on the expert reports from Samet, Stonnington,
10:56:13 4 Jarvis and David. Do you see that?

10:56:15 5 A. I see that.

10:56:16 6 Q. Okay. So it's my understanding you spent
10:56:17 7 one hour reviewing those four expert reports; correct?

10:56:20 8 A. As I said, I -- I did not -- probably did
10:56:23 9 not read any of them in -- in great detail.

10:56:25 10 Q. Okay. On April 8th it also states "expert
10:56:29 11 report from Elghobashi and drafted rebuttal," one
10:56:33 12 hour; correct?

10:56:33 13 A. Yes.

10:56:34 14 Q. What part of his report -- is the --
10:56:38 15 Is the rebuttal aspect of Elghobashi what
10:56:42 16 you have in your report here in Exhibit 1?

10:56:46 17 A. That -- that was the beginning of that, yes.

10:56:48 18 Q. Okay. Do you agree that Dr. Elghobashi is
10:56:56 19 an expert in the field of particle flow?

10:56:58 20 A. I --

10:57:02 21 Again, I don't know him very well, so I -- I
10:57:05 22 really have no opinion on that.

10:57:06 23 Q. Have you read any of his papers?

10:57:08 24 A. I don't believe I have.

10:57:08 25 Q. Okay. You've never heard of the Elghobashi

70

10:57:16 1 Map; correct?

10:57:17 2 A. I --

10:57:19 3 No, I have not.

10:57:19 4 Q. So sitting here today you have no idea what

10:57:21 5 the Elghobashi Map refers to.

10:57:24 6 MR. GOSS: Are you saying "map?"

10:57:26 7 MR. ASSAAD: Map.

10:57:26 8 MR. GOSS: Okay.

10:57:26 9 A. I do not.

10:57:28 10 Q. Okay. Do you know what DNS is?

10:57:30 11 A. Yes.

10:57:31 12 Q. What's DNS?

10:57:33 13 A. Direct Numerical Simulation.

10:57:35 14 Q. Do you have access to any DNS software?

10:57:38 15 A. I think at the University I probably do.

10:57:40 16 Q. Okay. What software would that be?

10:57:43 17 A. I -- I do not know.

10:57:43 18 Q. Okay. Have you used any DNS software?

10:57:46 19 A. I have not used any myself, no.

10:57:48 20 Q. Do you agree that DNS software is more

10:57:52 21 advanced than ANSYS, Fluent or CFX?

10:57:57 22 A. That -- that's my understanding.

10:57:58 23 Q. Okay. And it's also your understanding that

10:58:00 24 very few supercomputers in the world could actually

10:58:04 25 use DNS.

10:58:05 1 A. I have no opinion on that.

10:58:07 2 Q. Okay. Are you familiar with the

10:58:09 3 supercomputer at the University of Minnesota?

10:58:11 4 A. Yes.

10:58:11 5 Q. How many cores does it have?

10:58:13 6 A. I -- I don't know. I have not used that for

10:58:15 7 many years.

10:58:15 8 Q. Okay. Are you aware that the license that

10:58:44 9 the University of Minnesota has for ANSYS is not

10:58:48 10 licensed for research work?

10:58:51 11 A. Could you repeat the question?

10:58:53 12 Q. Are you aware that the license for --

10:58:57 13 that -- the license as used at -- that the University

10:59:00 14 of Minnesota has for the use of ANSYS is not licensed

10:59:05 15 for research work?

10:59:05 16 A. I -- I'm not aware of that, no.

10:59:07 17 Q. Okay. And in fact it's also supposed to be

10:59:10 18 used for students enrolled in classes that use ANSYS,

10:59:15 19 or instructors and TAs involved in the course that

10:59:16 20 makes use of ANSYS software products.

10:59:19 21 A. That -- that could be the case. I do not

10:59:21 22 know.

10:59:31 23 (Kuehn Exhibit 5 was marked for

10:59:33 24 identification.)

10:59:33 25 BY MR. ASSAAD:

10:59:37 1 Q. What's been marked as Exhibit 5 is a copy of
10:59:39 2 a page of the website. If you look at the bottom
10:59:43 3 page, left, it gives you the web address, and if you
10:59:47 4 look at the upper left-hand corner it says the date
10:59:50 5 that this was copied off of the website. Do you
10:59:56 6 recognize Exhibit 5?

10:59:59 7 A. I have not seen this before, no.

11:00:01 8 Q. Do you know what CSE-IT stands for?

11:00:06 9 A. I believe CSE stands for College of Science
11:00:09 10 and Engineering --

11:00:09 11 Q. Yes.

11:00:10 12 A. -- and IT is probably Information
11:00:14 13 Technology. But that's --

11:00:17 14 I'm fairly sure about CSE; I'm making a
11:00:20 15 guess at IT.

11:00:20 16 Q. Do you agree with me that, based on your
11:00:25 17 knowledge today, that this is a page taken from the
11:00:27 18 University of Minnesota website?

11:00:31 19 A. It appears to be, yes.

11:00:32 20 Q. Okay. And on top it talks about "ANSYS
11:00:36 21 License."

11:00:37 22 A. Yes.

11:00:37 23 Q. Okay. Do you see where it says under "ANSYS
11:00:42 24 License," "This copy of Ansys is NOT LICENSED FOR
11:00:44 25 RESEARCH WORK?"

11:00:45 1 A. I see that.

11:00:46 2 Q. And if you look at the bottom paragraph, it

11:00:49 3 says, "Access can be granted for use by students

11:00:51 4 enrolled in classes that use ANSYS or instructors and

11:00:55 5 TAs involved in the courses that make use of the ANSYS

11:00:59 6 software products?"

11:01:00 7 A. I see that.

11:01:01 8 Q. So you agree with me that under the license

11:01:03 9 agreement, based on this document, that no one should

11:01:05 10 be able to use ANSYS for any type of commercial work;

11:01:09 11 correct?

11:01:09 12 MR. GOSS: Object to form, lacks foundation.

11:01:16 13 A. Repeat the question.

11:01:17 14 Q. Well let's back up. I mean you've been in

11:01:21 15 academia for how many years, 30, 40 years?

11:01:24 16 A. About 40 years.

11:01:25 17 Q. Okay. And you're aware that companies will

11:01:27 18 give academic licenses to the university for -- for a

11:01:31 19 reduced rate to -- to train students; correct?

11:01:34 20 A. That's correct.

11:01:35 21 Q. Okay. And part of the --

11:01:38 22 And many of the licenses that are granted to

11:01:41 23 the university are -- are not to be used for

11:01:44 24 commercial purposes; correct?

11:01:45 25 A. That -- that's probably some license-

11:01:49 1 agreement language, yes.

11:01:50 2 Q. I mean you're familiar with that being in

11:01:52 3 academia for so many years; correct?

11:01:54 4 A. Yes.

11:01:54 5 Q. Okay. And companies do that because they

11:01:58 6 want students to become familiar with their products,

11:02:01 7 to use their products when they go out into the real

11:02:04 8 world; correct?

11:02:05 9 A. I agree with that.

11:02:06 10 Q. Okay. Because the cost for the license

11:02:12 11 for -- for an academic institution is much less than

11:02:16 12 the cost it would be for a private corporation.

11:02:19 13 A. That -- that's what I have heard.

11:02:20 14 Q. And in fact, when you --

11:02:22 15 When I was a student, and I'm sure your

11:02:28 16 students know, the cost of even getting Micro --

11:02:28 17 Microsoft Office as a student is much cheaper than

11:02:31 18 when you're not a student any more.

11:02:32 19 A. There again, they're student versions, too,

11:02:35 20 that are much cheaper.

11:02:36 21 Q. Yeah. So you agree with me that if anyone

11:02:41 22 used ANSYS for a commercial purpose, that would be in

11:02:43 23 violation of the ANSYS license with the University of

11:02:46 24 Minnesota; correct?

11:02:47 25 MR. GOSS: Object to form.

11:02:48 1 A. Well it says "LICENSED" -- "NOT LICENSED FOR
11:02:50 2 RESEARCH WORK." I -- I would imagine one would have
11:02:53 3 to interpret what that would mean.
11:02:55 4 Q. Well it also says, "Access can be granted
11:02:57 5 for use by students enrolled in classes..." It --
11:03:01 6 it's not access for any type of commercial use.
11:03:03 7 A. It says, "Access can be granted..." It says
11:03:08 8 access is restricted to.
11:03:15 9 Q. Well let me ask you this: If you -- would
11:03:17 10 this license --
11:03:18 11 Based on your reading of this license, would
11:03:20 12 a -- would a professor or a student be allowed to do
11:03:23 13 research for 3M under this license?
11:03:26 14 A. If -- if one were to define the term
11:03:33 15 "research" as indicated under here, then I would
11:03:37 16 agree.
11:03:37 17 Q. Well how do you define "research?"
11:03:40 18 A. Research is -- I would define as generating
11:03:43 19 new knowledge.
11:03:47 20 Q. In formulating your report, did you read any
11:04:03 21 of the depositions of any of the fact witnesses?
11:04:08 22 A. I'm not sure who the fact witnesses are.
11:04:10 23 If -- if you could identify --
11:04:12 24 Q. Did you read any of the depositions by any
11:04:15 25 of the engineers at 3M?

11:04:19 1 A. I don't believe so. But if you were to name
11:04:21 2 them, I could tell -- tell you "yes" or "no."
11:04:23 3 Q. Karl Zgoda.
11:04:24 4 A. Yes.
11:04:25 5 Q. You've read his deposition.
11:04:26 6 A. Yes.
11:04:27 7 Q. Okay. What about Gary Hansen?
11:04:29 8 A. I do not believe so.
11:04:32 9 Q. What about Al Van Duren?
11:04:34 10 A. No.
11:04:35 11 Q. What about Michelle Hulse Stevens?
11:04:38 12 A. No.
11:04:39 13 Q. Are the only depositions you have read are
11:04:41 14 the ones outlined in Exhibit 1 on your report, as well
11:04:47 15 as the depositions that -- of -- of the plaintiffs'
11:04:50 16 experts provided to you by defense counsel?
11:04:52 17 A. I believe that to be correct.
11:04:53 18 Q. And Jim Ho, who is a defense expert.
11:04:55 19 A. Yes.
11:04:56 20 Q. Okay. Did you -- were you provided --
11:05:07 21 strike that.
11:05:08 22 Are you aware that there are about five to
11:05:19 23 eight peer-reviewed articles that discuss either
11:05:31 24 particle flow or disruption of the operating room
11:05:38 25 environment or filtration with respect to the Bair

11:05:43 1 Hugger?

11:05:44 2 A. I do not know the exact number, but I -- I

11:05:47 3 know there are some peer-reviewed publications, yes.

11:05:49 4 Q. And the ones that you know about are the

11:05:51 5 ones provided to you by defense counsel.

11:05:53 6 A. I think that's correct.

11:06:00 7 Q. Do you know who Dr. Sessler is?

11:06:02 8 A. I have heard the name.

11:06:04 9 Q. Before this litigation?

11:06:06 10 A. No.

11:06:07 11 Q. Okay. How have you heard the name?

11:06:09 12 A. Just through discussions with counsel.

11:06:12 13 Q. Okay. Have you read any of his peer-

11:06:16 14 reviewed articles?

11:06:16 15 A. I do not believe I have.

11:06:17 16 Q. Do you know who Dr. McGovern is?

11:06:21 17 A. I do not.

11:06:22 18 Q. Do you know who Dr. Reed is?

11:06:24 19 A. I have read one of his papers, but other

11:06:27 20 than that, I do not know who he is.

11:06:28 21 Q. The paper that was provided to you; correct?

11:06:30 22 A. Yes.

11:06:31 23 Q. Do you know who Mark Albrecht is?

11:06:32 24 A. I --

11:06:34 25 Prior to this --

11:06:36 1 Q. Litigation.
11:06:37 2 A. -- litigation, no.
11:06:39 3 Q. But you've read some of his articles.
11:06:41 4 A. Yes.
11:06:41 5 Q. Do you know who Dr. Belani is?
11:06:43 6 A. No.
11:06:44 7 Q. Do you know Dr. Belani used to be the chair
11:06:46 8 of anesthesiology at the University of Minnesota?
11:06:49 9 A. I was not aware of that, no.
11:06:50 10 Q. Did you --
11:06:53 11 Were you provided with a deposition -- the
11:06:55 12 corporate representative deposition of 3M in which it
11:07:02 13 was 3M's -- well strike that.
11:07:03 14 Do you know what a corporate deposition is?
11:07:05 15 A. I -- I do not. Please educate me.
11:07:07 16 Q. Okay. In litigation there's a deposition
11:07:11 17 which you actually take the deposition of 3M and they
11:07:15 18 provide a person to speak on behalf of 3M.
11:07:19 19 A. Okay.
11:07:19 20 Q. Did you read any of the depositions of any
11:07:21 21 of the corporate representative depositions?
11:07:24 22 A. Other than the one that I mentioned by Karl
11:07:27 23 Zgoda, I don't believe I have.
11:07:28 24 Q. Okay. Do you know who Nachtsheim is?
11:07:33 25 A. I do not.

11:07:38 1 Q. Okay. Did you review any of the depositions
11:07:51 2 with respect to any of the study authors in this case?
11:07:56 3 A. Could -- could you repeat that?
11:07:59 4 Q. Are you aware that 3M took the depositions
11:08:04 5 of many of the authors that had peer-reviewed
11:08:08 6 literature that questioned the safety of the Bair
11:08:11 7 Hugger device?
11:08:13 8 A. I was not aware of those depositions, no.
11:08:15 9 Q. Do you think reading those depositions would
11:08:18 10 have been helpful in formulating your opinions?
11:08:20 11 A. Possibly.
11:08:21 12 Q. Do you know who Farhad Memarzadeh is?
11:08:35 13 A. Again, I have heard the name. I do not know
11:08:37 14 him personally.
11:08:39 15 MR. GOSS: Memarzadeh.
11:08:41 16 Q. Memarzadeh. Does that refresh your
11:08:43 17 recollection when it's Memarzadeh?
11:08:44 18 A. I still do not know him.
11:08:47 19 Q. Okay. Are you aware that he's done
11:08:50 20 computational fluid dynamic work with respect to
11:08:53 21 operating rooms?
11:08:55 22 A. I do not recall that.
11:08:56 23 Q. Are you a member of the -- are you a member
11:09:00 24 of the ASHRAE Rule 72 Committee?
11:09:02 25 A. I'm not.

11:09:03 1 Q. Okay. Do you know what the Rule 72
11:09:06 2 Committee is?
11:09:06 3 A. I'm -- I'm not sure what the title of that
11:09:09 4 would be.
11:09:09 5 Q. Dealing with hospital rooms or -- and hos --
11:09:10 6 and air -- hos -- healthcare facilities.
11:09:13 7 A. That -- that's not --
11:09:14 8 170 you say?
11:09:15 9 Q. I'm sorry, 172.
11:09:17 10 A. Yeah. No, I'm not a member of that.
11:09:19 11 Q. Okay. You're a member of the 52 Committee;
11:09:22 12 right?
11:09:22 13 A. Actually, I'm not a member of 52, I'm a
11:09:24 14 member of the technical committee that oversees
11:09:26 15 Standards Committee 52.2.
11:09:39 16 Q. Okay.
11:09:39 17 (Discussion off the stenographic record.)
11:09:47 18 Q. Now in reading your report, I just want to
11:10:08 19 be clear so I understand you. Is -- is it your
11:10:15 20 opinion that the Bair Hugger has no impact on the
11:10:24 21 airflow environment of an operating room?
11:10:28 22 A. I think my opinion would be somewhat more
11:10:31 23 restrictive than that, that it has negligible effect
11:10:35 24 on the airflow near the surgical site.
11:10:37 25 Q. On the surgical --

11:10:37 1 And when you say "negligible," what do you
11:10:44 2 mean by "negligible?"
11:10:44 3 A. One would not be able to measure the
11:10:44 4 difference whether the Bair Hugger was being used or
11:10:47 5 not at the surgical site, everything else being equal.
11:10:51 6 Q. Okay. Does it have an impact on the
11:10:52 7 unidirectional airflow?
11:10:54 8 A. I would say no.
11:10:55 9 Q. Okay. Does it have any impact in the
11:11:07 10 operating room with respect to airflow?
11:11:11 11 A. I guess we would have to define "impact." I
11:11:19 12 would say it does circulate some of the air in one
11:11:24 13 portion of the operating room, behind the anesthesia
11:11:27 14 drape, but as -- as I said, I do not believe it would
11:11:31 15 have any significant effect of the airflow near the
11:11:35 16 surgical site.
11:11:36 17 Q. And with respect to your filtration opinion,
11:11:46 18 it's your understanding that the filters used by 3M
11:11:49 19 are -- have a MERV 14 rating; correct?
11:11:52 20 A. That's my understanding, yes.
11:11:53 21 Q. Okay. And have you yourself done any
11:12:03 22 biological sampling of the bioburden in an operating
11:12:07 23 room?
11:12:07 24 A. No, I have not.
11:12:09 25 Q. Do you know what the bioburden in an

11:12:12 1 operating room is?

11:12:13 2 A. Not having worked in that area, I do not
11:12:15 3 know that.

11:12:15 4 Q. Okay. Do you agree with me that to
11:12:18 5 determine the type of filter to be used and to
11:12:24 6 formulate an opinion on that, knowing what the
11:12:27 7 bioburden in an operating room is necessary?

11:12:30 8 A. Well I do know this case is really focused
11:12:34 9 on bacteria-containing particles, and therefore my
11:12:37 10 opinion is based on the filter performance at that
11:12:41 11 type of particle and that particle size.

11:12:43 12 Q. Okay. We'll get to that later on.

11:12:47 13 Did you request to see the expert reports
11:13:18 14 provided by the defense in this case?

11:13:21 15 A. I -- I did not know what expert reports
11:13:24 16 there were, so they were provided to me by counsel.

11:13:26 17 Q. So until you were provided the expert report
11:13:29 18 of Jim -- or the expert deposition of Jim Ho, you had
11:13:32 19 no idea that Jim Ho was retained by the defense in
11:13:35 20 this case?

11:13:35 21 A. I had no idea.

11:13:36 22 Q. And with respect to Gary Settles, you had no
11:13:47 23 idea that Gary Settles was an expert in this case?

11:13:50 24 A. Prior to counsel mentioning that, no.

11:13:55 25 Q. Sitting here today -- well strike that.

11:14:06 1 Are you aware that Gary Settles took
11:14:09 2 temperature measurements when the Bair Hugger was in
11:14:11 3 use?

11:14:11 4 A. I -- I do not recall that.

11:14:15 5 Q. When you say you don't recall that, were
11:14:18 6 you --

11:14:18 7 You haven't seen his report; correct?

11:14:20 8 A. I have not seen his report.

11:14:22 9 Q. Were you ever informed that Gary Settles
11:14:24 10 took temperature measurements of the Bair Hugger
11:14:27 11 similar to what you did?

11:14:28 12 A. I -- I do not remember that.

11:14:31 13 Q. When you say you do not remember that, I
11:14:33 14 mean did you or did you not see it?

11:14:36 15 A. I -- I can't recall.

11:14:36 16 Q. Okay. Have you looked at Dr. Abraham's
11:14:43 17 report?

11:14:44 18 A. I have not seen that.

11:14:44 19 Q. Have you looked at his CFD analysis at all?

11:14:48 20 A. I have not seen anything from John related
11:14:50 21 to this case.

11:14:51 22 Q. Okay. Have you ever authored anything with
11:14:55 23 Dr. Abraham?

11:14:55 24 A. I do not believe so, no.

11:15:01 25 Q. Have you looked at any comments or materials

11:15:06 1 from the CDC with respect to this case?

11:15:12 2 A. I -- I do not believe I have, no.

11:15:14 3 Q. Do you know what Schlieren testing is?

11:15:22 4 A. I do.

11:15:24 5 MR. ASSAAD: And Schlieren is spelled

11:15:26 6 S-c-h --

11:15:28 7 THE REPORTER: I know it.

11:15:29 8 MR. ASSAAD: Okay.

11:15:29 9 Q. Have you ever used Schlieren testing?

11:15:34 10 A. Yes, I have.

11:15:34 11 Q. When is the last time you used Schlieren

11:15:35 12 testing?

11:15:35 13 A. Probably during my Ph.D. thesis work, maybe

11:15:39 14 40 years ago.

11:15:40 15 Q. Okay. Have you seen any Schlieren testing

11:15:51 16 done by 3M?

11:15:52 17 A. I have not.

11:15:55 18 Q. Have you seen any Schlieren testing by any

11:15:58 19 of the defense experts?

11:15:58 20 A. I have not seen any -- any Schlieren work

11:16:01 21 regarding this -- this case.

11:16:02 22 Q. Do you know many people -- do you know --

11:16:05 23 Do you know whether or not many engineers

11:16:06 24 still use Schlieren testing?

11:16:07 25 A. My understanding is that not very many.

11:16:09 1 Q. They give you more of a qualitative result,
11:16:18 2 not a quantitative result; correct?

11:16:20 3 A. You can actually get quantitative results
11:16:25 4 from Schlieren if it's set up properly.

11:16:29 5 Q. Well when you say if it's set up -- set up
11:16:35 6 properly, what do you mean?

11:16:36 7 A. I helped author a chapter in a textbook on
11:16:40 8 optical methods of temperature measurement, which
11:16:42 9 includes Schlieren method -- measurements.

11:16:44 10 Q. So you can measure temperature by looking at
11:16:47 11 a Schlieren image?

11:16:49 12 A. You can, yes.

11:16:50 13 Q. Does it have to be a color image?

11:16:53 14 A. Doesn't necessarily have to be color, it
11:16:55 15 could be gray scale.

11:16:57 16 Q. Okay. Is it a -- is it a very complicated
11:16:59 17 mathematical equation?

11:17:00 18 A. The procedure for getting the image is very
11:17:03 19 straightforward. Again, it would have to be
11:17:05 20 calibrated to actually back out appropriate
11:17:07 21 temperature data.

11:17:08 22 Q. So it has to be set up properly; correct?

11:17:10 23 A. Yes.

11:17:11 24 Q. Does it use a different type of camera?

11:17:14 25 A. You can use a standard optical camera.

11:17:17 1 Q. Okay. Are you surprised, sitting here
11:17:33 2 today, that these other expert reports and testing
11:17:35 3 done of the Bair Hugger, they were not provided to
11:17:38 4 you?

11:17:39 5 A. I -- I guess not knowing everything that's
11:17:42 6 out there, I -- no, I'm not surprised.

11:17:44 7 Q. Well do you think it's strange that Gary
11:17:47 8 Settles did temperature measurements as well and that
11:17:50 9 information wasn't provided to you?

11:17:51 10 MR. GOSS: Object to form.

11:17:53 11 A. Actually, I think that may have been a -- a
11:17:58 12 wise decision to have two completely independent
11:18:02 13 people try to measure similar things.

11:18:03 14 Q. And if they came up with the same result,
11:18:05 15 that would validate each other; correct?

11:18:07 16 A. I think that would -- that would certainly
11:18:08 17 support each other, yeah.

11:18:09 18 Q. What if they came up with different results?

11:18:12 19 A. Then we'd have to look in -- in more detail
11:18:15 20 as to what the differences were in the setup or the
11:18:17 21 measurements.

11:18:18 22 Q. Because the setup makes a difference;
11:18:20 23 correct? The way the experiment is set up; correct?

11:18:22 24 A. And the -- and the instruments used, yes.

11:18:24 25 Q. Okay. Sitting here today, do you believe

11:19:15 1 that 3M gave you all the information necessary to
11:19:19 2 formulate your opinions?

11:19:23 3 A. I would -- I would say they hopefully did
11:19:27 4 not withhold anything to support my opinion.

11:19:29 5 Q. Well you haven't received any of the
11:19:31 6 depositions of the fact witnesses; correct?

11:19:33 7 MR. GOSS: Object to form.

11:19:34 8 Q. Except for Karl Zgoda.

11:19:38 9 MR. GOSS: Object to form.

11:19:38 10 A. As -- as -- as you outlined, yes.

11:19:40 11 Q. Let's say it this way: There's many
11:19:43 12 depositions you have not reviewed in this case from
11:19:45 13 any of the fact witnesses in this case; correct?

11:19:47 14 A. The fact witnesses that -- that you listed,
11:19:50 15 yes.

11:19:50 16 Q. Yes. And you haven't received any of those
11:19:52 17 depositions of any of the study authors in this case;
11:19:55 18 correct?

11:19:55 19 A. And the study authors are --

11:19:57 20 Q. Albrecht, Reed, McGovern, Nachtsheim,
11:20:02 21 Belani.

11:20:02 22 A. That's correct.

11:20:05 23 Q. You haven't received any of the depositions
11:20:08 24 of -- the corporate representative depositions.

11:20:11 25 A. Other than if you include Karl Zgoda's, no.

11:20:15 1 Q. That's not a corporate --

11:20:16 2 I'm talking about the one done by Al Van

11:20:19 3 Duren.

11:20:19 4 A. No, I have not seen those.

11:20:20 5 Q. Do you think that if 3M admits that the Bair

11:20:27 6 Hugger -- every study that looked at whether or not

11:20:31 7 particles are increased over the surgical site by the

11:20:35 8 Bair Hugger, that it actually occurred, that would be

11:20:38 9 something important to know?

11:20:39 10 MR. GOSS: Object to form.

11:20:42 11 A. I don't know how they would approach that or

11:20:45 12 attribute that.

11:20:46 13 Q. Well if 3M did a study and many other people

11:20:49 14 did a study and all the studies indicated that when

11:20:51 15 the Bair Hugger is turned on there were increased

11:20:53 16 particles over the surgical site, isn't that

11:20:55 17 information you would think would be relevant in

11:20:57 18 formulating your opinions?

11:20:58 19 MR. GOSS: Same objection.

11:21:00 20 A. I'm -- I'm -- I'm not sure I would agree

11:21:02 21 with that.

11:21:05 22 Q. Well whether or not you agree with it or

11:21:05 23 not, do you agree that if peer-reviewed literature

11:21:08 24 done by 3M as well as others all indicate that

11:21:13 25 particles increase over the surgical site when the

11:21:16 1 Bair Hugger is turned on, that would be relevant
11:21:19 2 information and necessary information for you to know
11:21:23 3 in formulating your opinions?

11:21:24 4 MR. GOSS: Same objection.

11:21:25 5 A. I am not sure that would be necessary
11:21:27 6 opinion -- or necessary information.

11:21:29 7 Q. It would be relevant; correct?

11:21:30 8 A. It would be relevant.

11:21:33 9 Q. Okay. I mean you would want to look at the
11:21:35 10 test to see why the particles increased and what their
11:21:39 11 setup was and how the test was performed; correct?

11:21:41 12 MR. GOSS: Same objection.

11:21:44 13 A. And in terms of measuring particles, there
11:21:45 14 are a lot of pitfalls involved with that.

11:21:49 15 Q. Okay. So you don't believe in particle
11:21:52 16 testing?

11:21:53 17 A. I believe in particle testing if -- if it's
11:21:56 18 done appropriately, but as I mentioned, there are many
11:21:59 19 pitfalls involved in performing correct aerosol
11:22:02 20 measurements.

11:22:03 21 Q. I mean in fact you -- you -- you recommend
11:22:05 22 particle testing as an alternative in clean rooms;
11:22:09 23 correct?

11:22:09 24 MR. GOSS: Objection, vague.

11:22:11 25 A. Say that again.

11:22:12 1 Q. Well you recommend, in -- in -- in -- in
11:22:19 2 determining whether or not a clean room is working
11:22:22 3 properly, as an alternative to doing biological
11:22:25 4 testing, that you could do particle testing.

11:22:29 5 A. That's a protocol that's often used by some
11:22:32 6 manufacturers, yes.

11:22:33 7 Q. And it's something that you've actually
11:22:34 8 recommended in papers before; isn't it?

11:22:36 9 A. Yes.

11:22:36 10 Q. Okay. Because I think you --
11:22:40 11 If I recall correctly, a room is not static,
11:22:47 12 it's dynamic; correct?

11:22:49 13 A. Yes. Air is moving.

11:22:50 14 Q. Okay. And there could be bursts in
11:22:55 15 particles that, even if you did a biological sampling,
11:22:57 16 you're not going to get any changes because of the
11:23:00 17 possible bursts in particles or -- as well as
11:23:03 18 biological bursts; correct?

11:23:04 19 A. You -- you may miss a burst event.

11:23:06 20 Q. And that's why particle monitoring is a good
11:23:11 21 alternative to biological sampling which takes days to
11:23:15 22 obtain the results.

11:23:16 23 A. Well again, biological sampling gives you,
11:23:19 24 if it's done correctly, very good information, it's
11:23:22 25 just that the information is provided in a delayed

11:23:24 1 manner.

11:23:25 2 Q. At least one day.

11:23:27 3 A. Usually at least one day for culturing, yes.

11:23:30 4 Q. Exactly. And that's why an alternative

11:23:32 5 would be particle sampling, which could give you

11:23:34 6 real-time data, and you could actually set it up to

11:23:36 7 give you an alarm if it goes over a certain amount;

11:23:40 8 correct?

11:23:40 9 A. You could do that, yes.

11:23:40 10 Q. And that's something you've recommended in

11:23:42 11 the past.

11:23:43 12 A. I'm not sure I have recommended that.

11:23:45 13 Certainly not for operating rooms.

11:23:46 14 Q. Well you --

11:23:46 15 Well for clean rooms.

11:23:48 16 A. That -- that's possible, yes.

11:23:52 17 Q. Okay. Well you've actually written on it.

11:23:55 18 A. Well I --

11:23:56 19 You'd have to refresh my memory going --

11:23:58 20 going back.

11:23:58 21 Q. And we will later on, but --

11:24:00 22 A. Okay.

11:24:01 23 Q. -- you don't deny that you've written on it.

11:24:03 24 A. Not at this point, no.

11:24:04 25 Q. And you would agree with me that as an

11:24:40 1 engineer, as a professor of engineering, that you
11:24:48 2 would expect to be provided by 3M in this case all the
11:24:59 3 testing that was done and -- all the testing that was
11:25:07 4 done by 3M or others so that at least you can compare
11:25:10 5 your results with what other people did; correct?

11:25:15 6 MR. GOSS: Object -- objection.

11:25:16 7 A. I would expect that would be the case.

11:25:21 8 Q. Assuming that all tests that were done with
11:25:34 9 the Bair Hugger, including particle tests, all showed
11:25:41 10 an increase in the particles when the Bair Hugger was
11:25:44 11 turned on, would that in any way affect your opinions?

11:25:50 12 MR. GOSS: Object to form.

11:25:52 13 A. I'd have to look at those -- all those --
11:25:55 14 those reports and then evaluate them.

11:25:58 15 Q. Excuse me?

11:25:59 16 A. I would have to look at all the reports and
11:26:02 17 then evaluate them.

11:26:03 18 Q. Okay. So it may affect your opinion.

11:26:05 19 A. It's possible.

11:26:06 20 Q. Okay. And if someone, such as someone at
11:26:44 21 the NIH, did a CFD analysis of the Bair Hugger and
11:26:49 22 showed that there was a disruption in the airflow when
11:26:53 23 the Bair Hugger was turned on, that may be relevant
11:26:57 24 information in formulating your opinions; correct?

11:27:02 25 MR. GOSS: Object to form.

11:27:03 1 A. Possibly. I'd have to look at the study and
11:27:08 2 make my own judgment.

11:27:08 3 Q. Okay. And, for example, if there was a
11:27:19 4 peer-reviewed article out there that indicate -- that
11:27:22 5 did temperature measurements around the operating room
11:27:25 6 table that showed a significant increase in -- a
11:27:34 7 statistically significant increase in the temperature
11:27:36 8 above the operating room table when the Bair Hugger
11:27:38 9 was on compared to when the Bair Hugger was off, that
11:27:42 10 may be relevant to you in formulating your opinions;
11:27:45 11 correct?

11:27:45 12 A. It's possible.

11:27:46 13 Q. Okay. But at least it would be a place for
11:27:50 14 you to compare your results to other peer-reviewed
11:27:55 15 literature in the field; correct?

11:27:56 16 A. Yes, I could do that.

11:28:00 17 Q. And by the way, your expert opinion is not
11:28:03 18 peer-reviewed; correct?

11:28:04 19 A. That's correct.

11:28:05 20 Q. Okay. It hasn't been tested or -- or
11:28:08 21 checked by any of the colleagues in your field;
11:28:10 22 correct?

11:28:10 23 A. It's -- it's my own personal opinion.

11:28:12 24 Q. Okay. Do you know -- do you know what peer
11:28:19 25 review is?

11:28:19 1 A. I do.

11:28:19 2 Q. What is peer review?

11:28:21 3 A. It's a review by colleagues who are familiar

11:28:24 4 with the -- in the engineering world, the technology

11:28:28 5 that you're working with.

11:28:29 6 Q. Okay. And it's like a checks and balances

11:28:32 7 to make sure there's no junk science published in the

11:28:36 8 literature; correct?

11:28:37 9 A. Assuming the -- the reviewers have

11:28:40 10 appropriate credentials and appropriate expertise to

11:28:43 11 evaluate your -- your publication or your -- your

11:28:47 12 report, then yes. That's not always the case.

11:28:50 13 Q. There is some junk science out there;

11:28:53 14 correct?

11:28:53 15 A. Yeah.

11:28:53 16 Q. And you will agree with me that there's

11:28:56 17 actually some dangerous products out there; correct?

11:28:59 18 A. I don't know how you would --

11:29:01 19 That seems to be a very broad --

11:29:03 20 Q. Well --

11:29:03 21 A. -- categorization.

11:29:04 22 Q. There -- there are devices out there that

11:29:07 23 end up being a risk to -- to humans, correct, that are

11:29:10 24 manufactured?

11:29:11 25 MR. GOSS: Object to form.

11:29:12 1 A. Well I can think of a car is a risk to
11:29:15 2 humans, too, if you get in an accident.
11:29:17 3 Q. Yeah. But there's, for example, the Pinto.
11:29:19 4 The Pinto was a dangerous device; correct?
11:29:21 5 A. Well it was a car that had a lot of
11:29:23 6 accidents associated with it.
11:29:24 7 Q. Yeah. And it caused severe injuries as a
11:29:27 8 result of a design error; correct?
11:29:29 9 A. Well I'm not sure if you'd say design error,
11:29:32 10 but based on the product.
11:29:34 11 Q. Well the product was designed; correct?
11:29:37 12 A. It was designed.
11:29:38 13 Q. Okay. And there was an error in the design
11:29:41 14 that could have been fixed that wasn't fixed; correct?
11:29:44 15 MR. GOSS: I'm just going to object to
11:29:45 16 foundation on this.
11:29:46 17 Q. You're aware of the Pinto case; correct?
11:29:48 18 A. Yes.
11:29:48 19 Q. Okay. And you actually --
11:29:52 20 I mean in most engineering schools you're
11:29:55 21 taught about that case; correct?
11:29:56 22 A. I -- I'm not aware of that. I'm not in that
11:29:58 23 area.
11:29:59 24 Q. You're not in engineering ethics?
11:30:01 25 A. Well I'm in engin --

11:30:04 1 I've never taught a class in engineering
11:30:06 2 ethics and I don't -- would not work with the Pinto,
11:30:08 3 for example, in any -- any of my examples.
11:30:11 4 Q. You've never taught -- taught a class on
11:30:14 5 engineering ethics?
11:30:15 6 A. I've never -- never taught a class on
11:30:18 7 engineering ethics, no.
11:30:27 8 Q. Have you ever taken a class in engineering
11:30:31 9 ethics?
11:30:32 10 A. I've taken some -- I wouldn't call it a -- a
11:30:36 11 class or a --
11:30:38 12 Training I would say.
11:30:51 13 Q. Are there any other Kuehns that teach at the
11:31:10 14 University of Minnesota in the engineering department?
11:31:13 15 A. Not with the same spelling of my name that
11:31:15 16 I'm aware of.
11:31:16 17 Q. Okay.
11:31:24 18 A. I couldn't rule it out, but I don't know of
11:31:26 19 any personally.
11:31:28 20 Q. Do you agree that engineers should uphold
11:31:32 21 and advance the integrity, honor and dignity of the
11:31:35 22 engineering profession?
11:31:38 23 A. I will agree with that.
11:31:38 24 Q. Do you agree that engineers should be
11:31:41 25 objective?

11:31:42 1 A. Yes.

11:31:46 2 Q. Do you agree that engineers should have --

11:31:49 3 should be honest?

11:31:50 4 A. Yes.

11:31:50 5 Q. Do you believe that engineers should have

11:31:53 6 integrity?

11:31:54 7 A. Yes.

11:31:54 8 Q. Do you believe that they need all those

11:31:57 9 things in formulating their opinions?

11:32:01 10 A. Yes, that would be --

11:32:01 11 Q. Honesty, integrity and objectivity.

11:32:04 12 A. I -- I would agree with that.

11:32:06 13 Q. Okay. Do you believe that engineers of 3M

11:32:09 14 should be held to the same standard?

11:32:11 15 A. Well I think all engineers should be held to

11:32:13 16 the same standard.

11:32:14 17 Q. Okay. Do you agree that engineers must use

11:32:27 18 their knowledge and skill for enhancement of human

11:32:31 19 welfare?

11:32:32 20 A. I -- I would agree with that.

11:32:34 21 Q. Do you agree that human safety should always

11:32:36 22 come first?

11:32:38 23 A. I'm not sure I would agree with that.

11:32:41 24 Q. You don't believe safety should come first?

11:32:44 25 A. If -- if a product doesn't do what it's

11:32:48 1 supposed to, then -- then the safety is -- is
11:32:50 2 immaterial.

11:32:51 3 Q. Okay. Do you believe, with respect to
11:33:01 4 designing a medical device that goes in an operating
11:33:03 5 room, that the medical device should not increase the
11:33:11 6 risk of harm to a patient?

11:33:14 7 MR. GOSS: Object to form, --

11:33:14 8 A. I --

11:33:16 9 MR. GOSS: -- foundation.

11:33:17 10 A. I -- I would agree.

11:33:19 11 Q. I mean I'm not sure you're aware of this,
11:33:23 12 but I'm an engineer as well, mechanical engineer,
11:33:25 13 graduate from the University of Florida, and I was
11:33:29 14 always taught that engineering is a profession, not
11:33:32 15 just a job. You have a duty to the public. Do you
11:33:34 16 agree with that?

11:33:35 17 A. I -- I agree with that.

11:33:36 18 Q. So engineering is -- is -- is a profession.

11:33:38 19 A. Yes.

11:33:39 20 Q. You have a duty to the public; correct?

11:33:41 21 A. Yes.

11:33:41 22 Q. And as a professor of engineering, you have
11:33:46 23 a duty to teach ethical behavior to your students;
11:33:50 24 correct?

11:33:50 25 A. It's included in our curriculum, yes.

11:33:52 1 Q. Okay. You guys actually have a class on
11:33:55 2 that; correct?

11:33:56 3 A. Yes.

11:33:57 4 Q. And you teach your students that engineers
11:34:02 5 need to be honest.

11:34:03 6 A. Yes.

11:34:04 7 Q. To be impartial.

11:34:04 8 A. Yes.

11:34:05 9 Q. To serve with fidelity to the public.

11:34:11 10 A. Sounds like you're reading from something,
11:34:13 11 but --

11:34:14 12 It sounds like a -- like in the ASME Code of
11:34:17 13 Ethics or something. So --

11:34:18 14 Q. And that's a code of ethics by the American
11:34:22 15 Society of Mechanical Engineers; correct?

11:34:22 16 A. That's where I thought it was coming from,
11:34:24 17 yes.

11:34:24 18 Q. And it should be applied to all engineers;
11:34:26 19 correct?

11:34:26 20 A. Yes.

11:34:27 21 Q. Even 3M engineers; correct?

11:34:29 22 A. As I said before, all engineers.

11:34:30 23 Q. So you agree that 3M -- 3M's engineers
11:34:33 24 should be honest, impartial, and serve with fidelity.

11:34:38 25 A. Yes.

100

11:34:38 1 Q. Okay. And as an expert in this case and as
11:34:50 2 a member of ASME, you must follow engineering ethics;
11:34:55 3 correct?

11:34:55 4 A. Yes.

11:34:55 5 Q. And to do that and to do that in formulating
11:34:59 6 your opinion, you should have all the information --
11:35:03 7 reasonable information available to you in formulating
11:35:04 8 your opinion; correct?

11:35:06 9 A. I think all reasonable information, yes.

11:35:08 10 Q. Okay. You should have all the relevant
11:35:10 11 studies that were done to review before formulating
11:35:15 12 your opinions; correct?

11:35:16 13 A. All that I think are relevant, yes.

11:35:19 14 Q. Okay. And you should have the opinions --
11:35:22 15 all the relevant studies, whether or not they're
11:35:26 16 supportive or critical of the Bair Hugger in this
11:35:29 17 case, correct, before formulating your opinion;
11:35:30 18 correct?

11:35:30 19 A. That would be ideal.

11:35:32 20 Q. Well as an engineer, before you solve a
11:35:36 21 problem, you have to research the problem; correct?

11:35:38 22 A. Yes.

11:35:40 23 Q. Okay. That -- that goes to the integrity of
11:35:44 24 your opinions; correct?

11:35:45 25 A. Yes.

11:35:45 1 Q. Okay. And you would expect that 3M would
11:35:56 2 provide you with all the information they had
11:35:59 3 available to educate you on the issues in this case;
11:36:09 4 correct?

11:36:09 5 A. That would be my assumption.

11:36:10 6 Q. Because at the end of the day when it comes
11:36:14 7 to engineering and formulating your opinion, integrity
11:36:17 8 and honesty are the most important things; correct?

11:36:20 9 A. I think personally, yes.

11:36:23 10 Q. Well as an engineer dealing with people's
11:36:26 11 lives and -- and coming to conclusions, you have to be
11:36:30 12 objective, honest, and have integrity.

11:36:33 13 MR. GOSS: Object to form, asked and
11:36:34 14 answered.

11:36:37 15 A. Yeah, I -- as I say, I think I've answered
11:36:39 16 that already.

11:36:43 17 Q. And these principles we're talking about,
11:36:47 18 engineering ethics, that's a required class for all
11:36:49 19 mechanical engineering students at the University of
11:36:53 20 Minnesota; correct?

11:36:54 21 A. It is.

11:36:55 22 Q. And I believe it's a required class for all
11:36:57 23 mechanical engineering students at any accredited
11:37:00 24 university; correct?

11:37:00 25 A. I believe it's an ABET requirement.

102

11:37:03 1 Q. Okay. And in fact you can't become a member
11:37:05 2 of the American Society of Mechanical Engineers unless
11:37:08 3 you've taken engineering ethics; correct?

11:37:10 4 A. I -- I -- I don't know about that level of
11:37:12 5 detail.

11:37:15 6 Q. Okay. You agree with me that engineers
11:37:24 7 should solve a potential problem instead of ignoring
11:37:27 8 it; correct?

11:37:29 9 A. Yes.

11:37:30 10 Q. I mean engineers are problem-solvers; right?

11:37:34 11 A. Yes.

11:37:34 12 Q. They're not problem-hiders. They don't hide
11:37:37 13 problems, they should solve problems; correct?

11:37:39 14 MR. GOSS: Object to form.

11:37:40 15 A. Well that's what -- what engineers are
11:37:41 16 trained to do.

11:37:41 17 Q. Okay. And if an engineer is aware of a
11:37:44 18 problem, it would be unethical to try to hide it
11:37:48 19 publicly; correct?

11:37:49 20 MR. GOSS: Object to form.

11:37:50 21 A. Possibly.

11:37:55 22 Q. That was a big issue with the Pinto, is that
11:37:58 23 the engineers, they looked at it and they tried to
11:38:00 24 hide it publicly instead of solving the problem
11:38:03 25 because the bean counters came up and said it would be

11:38:05 1 cheaper to pay off people in lawsuits than fix the
11:38:07 2 problem; correct?

11:38:08 3 A. I do not recall that level of detail on that
11:38:11 4 particular case.

11:38:11 5 Q. We'll get to that in a second then.

11:38:13 6 Are you aware of the Citibank case, Citibank
11:38:16 7 Building?

11:38:17 8 A. You'll have to educate me or remind me.

11:38:20 9 Q. The Citibank Building in New York City where
11:38:23 10 it was built and some graduate student came in later
11:38:26 11 on and realized that if the wind hit it at a certain
11:38:29 12 angle, the -- the skyscraper would fail. Does that
11:38:33 13 refresh your recollection?

11:38:34 14 A. I don't recall that, no.

11:38:35 15 Q. Okay. Now you agree with me that there's a
11:38:39 16 certain process that -- that engineers are taught when
11:38:42 17 there is a problem in a design.

11:38:46 18 A. I'm -- I'm not sure that's actually part of
11:38:49 19 the education.

11:38:49 20 Q. Okay. Well you agree with me when there is
11:38:57 21 a problem in a design, the first thing to look at is
11:39:02 22 to determine who are the stakeholders. Does that
11:39:08 23 sound familiar?

11:39:09 24 A. Well if there's a problem in the -- in the
11:39:12 25 design, it's usually the design does not meet the

11:39:15 1 expect -- expected requirements or expected outcome.

11:39:47 2 Q. What do you teach engineers when -- of what

11:39:55 3 to do when a potential problem is identified?

11:40:00 4 A. I'm not sure I actually teach that in any of

11:40:03 5 my courses.

11:40:21 6 Q. Were you ever taught what to do if and when

11:40:24 7 a problem is identified in the design that's out in

11:40:28 8 the -- in the market?

11:40:31 9 A. I do not recall that, no.

11:40:32 10 Q. Would you agree with me that an engineer who

11:41:14 11 has a potential problem identified to them should

11:41:19 12 identify a potential solution before they consider the

11:41:22 13 impact on potential stakeholders?

11:41:25 14 MR. GOSS: Object to form.

11:41:28 15 A. I -- I think an engineer would look at the

11:41:30 16 entire scenario and -- and determine what -- what a

11:41:36 17 possible path forward would be.

11:41:37 18 Q. So they would look at the cost of the

11:41:40 19 path -- the cost of the time when they're trying to

11:41:42 20 solve the problem?

11:41:43 21 A. That would be part of it.

11:41:44 22 Q. You think they should look at -- if

11:41:46 23 there's --

11:41:47 24 If there's a product out there that has

11:41:49 25 potential to injure people, that in finding a

105

11:41:56 1 solution, they should look at the cost of the
11:41:58 2 solution; is that your testimony today?
11:42:01 3 MR. GOSS: Objection, incomplete
11:42:02 4 hypothetical.
11:42:03 5 A. Again, an en --
11:42:05 6 Any engineering decisions, that's -- that's
11:42:07 7 always part of the final solution.
11:42:09 8 Q. I'm not talking about the final solution,
11:42:11 9 I'm talking about finding the initial solution.
11:42:14 10 Should they look at the cost?
11:42:16 11 MR. GOSS: Same objection.
11:42:17 12 A. It -- it's part of the path to the approach
11:42:20 13 of the final solution. It's one of the considerations
11:42:23 14 along the way.
11:42:24 15 Q. Is that what you teach your students?
11:42:31 16 MR. GOSS: Objection, form, asked and
11:42:32 17 answered.
11:42:34 18 Q. So sitting here today, you don't believe
11:42:37 19 you've ever taught a case -- a class in ethics.
11:42:40 20 A. As I said before, I've not taught -- taught
11:42:42 21 a class in ethics, no.
11:42:47 22 Q. Did you ever lecture on ethics?
11:42:58 23 A. I think as part of a training program for
11:43:03 24 graduate students, yes.
11:43:05 25 Q. Can you elaborate on that a little bit more.

11:43:09 1 A. Our -- our department has a separate you
11:43:15 2 might call it short course for -- for providing ethics
11:43:18 3 training for graduate students, and at one time I was
11:43:21 4 involved in -- in that course. And it was, again,
11:43:25 5 many years ago, so I don't remember the -- the details
11:43:27 6 of my -- my involvement.

11:43:29 7 Q. How long ago?

11:43:29 8 A. Probably 15 years ago.

11:43:31 9 Q. Okay. Would that be a 5000- or 6000-level
11:43:40 10 class?

11:43:41 11 A. No, it's a separate --
11:43:42 12 It -- it's not listed in the class schedule.
11:43:44 13 It's a separate simply ethics required course that all
11:43:48 14 graduate students must attend. Or I shouldn't say
11:43:51 15 course, a training.

11:44:19 16 MR. ASSAAD: Let's take a five-minute break.

11:44:22 17 THE REPORTER: Off the record, please.
18 (Recess taken.)

11:53:28 19 (Kuehn Exhibit 6 was marked for
11:53:30 20 identification.)

11:53:30 21 BY MR. ASSAAD:

11:53:30 22 Q. So marked as Exhibit 6 is a PowerPoint
11:53:34 23 presentation obtained from the University of Minnesota
11:53:39 24 in the fall of 2010 titled "ME 4054: Ethics in
11:53:45 25 Design." Do you see that?

11:53:45 1 A. I see that.

11:53:46 2 Q. And it says "Prof. Kuehn" at the bottom.

11:53:49 3 A. And also was 17 years ago, which is close to

11:53:52 4 my estimate of 15 years ago.

11:53:54 5 Q. It says fall of 2010.

11:53:57 6 A. Seven years ago. Okay.

11:53:58 7 Q. Okay.

11:53:59 8 A. My mistake.

11:54:00 9 Q. Okay. Does this refresh your recollection

11:54:03 10 of teaching a course on ethics in design?

11:54:07 11 A. This course ME 4054 is a -- is our senior

11:54:11 12 design course, and I apparently taught that course, it

11:54:16 13 must have been in fall of 2010, and --

11:54:19 14 Q. And --

11:54:19 15 A. -- this was the -- looks like the set of

11:54:22 16 notes I gave for that particular lecture.

11:54:25 17 Q. And it was on ethics; correct?

11:54:27 18 A. Yes.

11:54:27 19 Q. Okay. I'd like you to turn to page six. Do

11:54:50 20 you recall teaching your students about case study

11:54:53 21 number one, the Ford Pinto in the 1970s?

11:54:56 22 A. Apparently I must have.

11:54:57 23 Q. Okay. And you had some group discussion

11:55:01 24 items with respect to the case study of the Ford

11:55:05 25 Pinto, which is the slide on the bottom of the page;

11:55:07 1 correct?

11:55:07 2 A. Yes.

11:55:07 3 Q. It says, "Ford knows there's a problem."

11:55:10 4 What should they do?

11:55:11 5 "Group Discussion Items."

11:55:12 6 Do you see that?

11:55:13 7 A. I -- I don't -- do not see that.

11:55:26 8 Q. "Ford knows there's a problem."

11:55:28 9 A. Oh.

11:55:29 10 Q. "What should they do?"

11:55:31 11 A. Yes, okay.

11:55:32 12 Q. "Group Discussion Items."

11:55:34 13 A. Okay.

11:55:34 14 Q. And -- and this is what you're teaching your

11:55:37 15 students; correct?

11:55:38 16 A. This was a set of notes that was generic to

11:55:40 17 the course that -- that I used when I was facilitating

11:55:43 18 the -- the course at that time.

11:55:44 19 Q. And you were with a bunch of other

11:55:47 20 professors in that course; correct?

11:55:48 21 A. Yes.

11:55:48 22 Q. Okay. But you yourself taught this lecture

11:55:52 23 to your students; correct?

11:55:53 24 A. Apparently I did, yes.

11:55:55 25 Q. Okay.

11:55:55 1 MR. GOSS: I'm just going to state an
11:55:57 2 objection that he's not being offered to provide any
11:56:01 3 opinions on engineering ethics. That's my objection.
11:56:05 4 MR. ASSAAD: Okay.
11:56:08 5 Q. The first one are --
11:56:10 6 The first question is "Who are the
11:56:11 7 stakeholders?" What did you mean by that?
11:56:19 8 A. I guess going back and thinking about this
11:56:22 9 again, I mean I haven't looked at this for a long
11:56:26 10 time, it probably would include the -- the company,
11:56:30 11 the people who bought the product, and maybe other
11:56:35 12 service personnel.
11:56:36 13 Q. So basically the manufacturer and the
11:56:40 14 consumers; correct?
11:56:40 15 A. Well those would be the two main
11:56:43 16 stakeholders.
11:56:44 17 Q. So with respect to the Ford Pinto, the
11:56:46 18 stakeholders would be the -- the manufacturer, Ford;
11:56:51 19 correct?
11:56:51 20 A. Yes.
11:56:52 21 Q. The consumers that bought the Ford Pinto;
11:56:58 22 correct?
11:56:58 23 A. Yes.
11:56:58 24 Q. As well as, if there's a car accident, other
11:57:02 25 individuals that might be involved in the accident;

110

11:57:04 1 correct?

11:57:04 2 A. That's -- that's potentially correct, yes.

11:57:07 3 Q. Okay. But just to refresh your

11:57:08 4 recollection, you remember the Pinto had a problem

11:57:10 5 with the -- with the gas tank; correct?

11:57:12 6 A. Yes.

11:57:12 7 Q. Okay. And in certain rear-end collisions it

11:57:18 8 could cause it to catch on fire and explode.

11:57:20 9 A. That -- that's what I recall.

11:57:21 10 Q. Okay. And Ford knew about this problem but

11:57:24 11 decided not to do anything about it; correct?

11:57:26 12 A. That's what I had read.

11:57:27 13 Q. Okay. And in fact, based on this case

11:57:31 14 study, I'm sure that you taught your students what

11:57:35 15 Ford did was unethical; correct?

11:57:37 16 A. Yes.

11:57:37 17 Q. Okay. Because they put profits over safety;

11:57:41 18 correct?

11:57:41 19 A. Again --

11:57:44 20 MR. GOSS: Object to form.

11:57:45 21 A. Well, their approach to the problem was

11:57:47 22 perhaps not as expedient as -- as might be

11:57:51 23 anticipated --

11:57:51 24 Q. They ignored the problem.

11:57:52 25 A. -- or expected.

11:57:53 1 Q. They ignored the problem.

11:57:55 2 A. I can't speak for Ford, but --

11:57:58 3 Q. Okay. Under "Group Discussion Items,"

11:58:05 4 number two, you teach your students "Propose as many

11:58:09 5 different alternative solutions as you can think of;"

11:58:12 6 correct?

11:58:12 7 A. That's what it says.

11:58:14 8 Q. And you agree with that; correct?

11:58:16 9 A. Yes.

11:58:17 10 Q. Okay. It says, "Do not assign any value or

11:58:20 11 determine the implications of this proposed solution

11:58:23 12 for now;" correct?

11:58:24 13 A. That's the brainstorming part, yes.

11:58:27 14 Q. So you find a solution and you don't take

11:58:29 15 into account, at this time of -- of -- of the problem

11:58:32 16 solving, the implications of cost.

11:58:35 17 A. I believe that to be correct.

11:58:36 18 Q. Okay. And that's ethical; correct?

11:58:38 19 A. This is the first stage, the brainstorming-

11:58:42 20 potential-problem part of the solution, yes.

11:58:45 21 Q. Okay. So the first stage is propose

11:58:46 22 solutions, you know, and not to consider cost. Agree?

11:58:50 23 A. I would agree with that.

11:58:53 24 Q. Okay. And this is an outline that you

11:58:56 25 created; correct?

112

11:58:57 1 A. I did not, actually. This was an outline
11:59:00 2 provided to me by the overall course instructor for
11:59:03 3 the design course that I then used in this particular
11:59:06 4 lecture.

11:59:06 5 Q. But you don't disagree with this outline;
11:59:09 6 correct?

11:59:09 7 A. I do not disagree with it, no.

11:59:11 8 Q. And this is also taught by the American
11:59:14 9 Society of Mechanical Engineers; correct?

11:59:15 10 A. Yes.

11:59:15 11 Q. Okay. Once you come up with a solution, you
11:59:22 12 go to number three and it states, "Now try to predict
11:59:25 13 each option's impact on the stakeholders;" correct?

11:59:28 14 A. That's what it says.

11:59:29 15 Q. So, for example, in the Ford Pinto case you
11:59:31 16 look at what the cost would be to Ford as well as the
11:59:34 17 effect they put on the safety of the consumer as well
11:59:39 18 as other people that are on the road; correct?

11:59:40 19 A. I would think you would include all
11:59:42 20 stakeholders involved, yes.

11:59:44 21 Q. Okay. Number four is "Determine the best
11:59:49 22 possible course of action and explain the reasons for
11:59:51 23 your choice;" correct?

11:59:52 24 A. That's what it says.

11:59:53 25 Q. Okay. And that would be a -- similar to a

11:59:57 1 cost/benefit analysis; correct?

11:59:59 2 A. That would probably include cost, but this

12:00:05 3 is more than that.

12:00:05 4 Q. Well what else would it include?

12:00:06 5 A. Potential time to make potential

12:00:10 6 modifications, could it be done quickly or if it would

12:00:13 7 take mult -- multiple years, for example.

12:00:16 8 Q. Are you familiar with the Takata litigation?

12:00:20 9 A. Say that again.

12:00:21 10 Q. The Takata -- Takata/Takata litigation

12:00:24 11 regarding airbags?

12:00:25 12 A. I have heard of that. I'm not very familiar

12:00:27 13 with that.

12:00:27 14 Q. Okay. Do you know whether or not you have a

12:00:34 15 Takata airbag in your car?

12:00:36 16 A. I do not know.

12:00:37 17 MR. GOSS: I got a notice last week.

12:00:41 18 MR. ASSAAD: Off the record.

12:00:43 19 THE REPORTER: Off the record, please.

12:01:19 20 (Discussion off the record.)

12:01:19 21 BY MR. ASSAAD:

12:01:23 22 Q. Number five states, "Are your answers to the

12:01:25 23 above questions the same regardless of whom you

12:01:28 24 represent? In other words, does one's response change

12:01:32 25 depending on one's stake in the solution?" Did I read

12:01:34 1 that correctly?

12:01:35 2 A. I believe you read it correctly.

12:01:36 3 Q. When you taught that to your students, what

12:01:39 4 did you mean by that?

12:01:41 5 A. In what it says here, and I guess I would

12:01:49 6 agree with that, is whether you represent the -- let's

12:01:52 7 take two stakeholders, the manufacturer or the owners

12:01:56 8 of vehicles, that the solution should be acceptable to

12:01:59 9 both sides.

12:02:00 10 Q. Okay. So basically, if you're a consumer

12:02:04 11 that owns a Pinto, the solution should be I should

12:02:07 12 have a car that doesn't blow up and catch on fire.

12:02:10 13 A. Well the solution hopefully would be

12:02:12 14 whatever -- whatever would mitigate the problem in the

12:02:15 15 first place.

12:02:15 16 Q. Okay. So you're --

12:02:17 17 If you're the consumer, you want to drive a

12:02:20 18 car that's safe; correct?

12:02:21 19 A. You want to make sure the problem that was

12:02:23 20 identified had been corrected.

12:02:24 21 Q. And by "corrected," you mean driving a safe

12:02:28 22 car that the gas tank doesn't blow up.

12:02:30 23 A. I guess I would agree with that.

12:02:31 24 Q. Okay. And that's what you taught your

12:02:32 25 students as well. You should have a car --

12:02:34 1 In this case the solution should be a car
12:02:36 2 that's driven that doesn't blow up; correct?
12:02:38 3 A. I guess one could come to that conclusion,
12:02:40 4 yes.
12:02:42 5 Q. Well what's your conclusion?
12:02:43 6 A. Well that -- that would -- I would --
12:02:47 7 I would agree with that.
12:02:58 8 Q. Because as an engineer you have a
12:03:01 9 fidelity, you have a fidelity to the public; correct?
12:03:03 10 A. Yes.
12:03:12 11 Q. Go to page eight. Do you agree with respect
12:03:18 12 to the Ford Pinto that Ford decided not to change the
12:03:22 13 design?
12:03:24 14 A. That -- that didn't seem to be a wise
12:03:27 15 decision.
12:03:41 16 Q. And you write down, "An internal Ford memo
12:03:44 17 stated that it would be cheaper to pay off possible
12:03:46 18 lawsuits for resulting deaths than recall the
12:03:50 19 vehicles. A cost-benefit analysis compared the cost
12:03:52 20 of a \$13 repair against the monetary value of a human
12:03:56 21 life." Did I read that correctly?
12:03:57 22 A. I --
12:03:58 23 You read that correctly.
12:03:58 24 Q. And you agree with me that the engineers and
12:04:01 25 the people at Ford that decided to go along that

12:04:04 1 course of action, you consider that to be unethical.

12:04:07 2 A. I do.

12:04:08 3 Q. Go to page 14. You're familiar with the

12:04:50 4 Challenger explosion; correct?

12:04:51 5 A. Yes.

12:04:52 6 Q. And it was a faulty O-ring, do you recall

12:04:55 7 that?

12:04:55 8 A. I recall that.

12:04:56 9 Q. Okay. And in fact the potential for failure

12:05:22 10 was identified in the failure mode and effects

12:05:24 11 analysis process, but NASA management pushed for

12:05:29 12 launch. Do you recall -- recall --

12:05:31 13 Do you see that at the bottom?

12:05:31 14 A. I see that at the bottom, yes.

12:05:33 15 Q. And you recall that; correct?

12:05:35 16 A. I don't recall that detail at the time.

12:05:37 17 Again, someone else put these notes together, so I --

12:05:39 18 I would agree that's correct.

12:05:40 19 Q. But you were aware of the Challenger, and

12:05:42 20 later on they found out that they pushed for launch

12:05:44 21 even though they were aware of the possible failure of

12:05:47 22 the O-ring; correct?

12:05:48 23 A. I do recall that.

12:05:48 24 Q. And so they ignored -- they ignored the --

12:05:51 25 the -- the potential failure and decided to go for the

117

12:05:55 1 launch, and that was a big criticism, and determined
12:05:59 2 that that behavior was unethical according to
12:06:01 3 engineering standards; correct?
12:06:03 4 MR. GOSS: Objection, form, foundation.
12:06:04 5 A. I -- I don't -- I don't recall the
12:06:05 6 engineering-ethics part, but I do recall the -- the --
12:06:09 7 the issue.
12:06:12 8 Q. If you go to page 18 -- or 16, you teach
12:06:20 9 your students, "Compromise is not an option." Do you
12:06:24 10 agree with that?
12:06:25 11 A. That's what it says, and --
12:06:29 12 Q. That's what you taught your students.
12:06:31 13 A. Yes.
12:06:31 14 Q. Okay.
12:06:32 15 A. Uh-huh.
12:06:32 16 Q. It states, "Most engineers never encounter
12:06:34 17 an ethical dilemma during your career. If you do,
12:06:38 18 think it through and take advice as appropriate." Do
12:06:41 19 you agree with that?
12:06:42 20 A. Yes, I do.
12:06:43 21 Q. And then you teach your students, "Nine of
12:06:47 22 the most dangerous words in the English language are:
12:06:51 23 'If I ignore it, maybe it will go away.'" Do you
12:06:55 24 agree those are dangerous words as an engineer?
12:06:56 25 A. Yes.

12:06:57 1 Q. And that's not something you would teach
12:06:59 2 your students to do, to ignore potential problems.
12:07:02 3 A. Not -- not if you're certainly made aware of
12:07:06 4 it, no.
12:07:06 5 Q. Okay. And then you write down, "Most large
12:07:11 6 companies and organizations have an ethics or
12:07:14 7 ombudsman office that allows employees to report or
12:07:17 8 discuss ethics concerns confidentially." Do you know
12:07:19 9 whether or not 3M has such an office?
12:07:21 10 A. I have no idea.
12:07:26 11 Q. You agree that lack of due diligence could
12:07:35 12 create an ethical dilemma; correct?
12:07:37 13 MR. GOSS: Objection, vague.
12:07:43 14 A. Say that again.
12:07:45 15 Q. Lack of due diligence by ignoring something
12:07:48 16 could cause an ethical dilemma.
12:07:51 17 A. Potentially, yes.
12:07:52 18 Q. Okay. You agree that engineers and the
12:08:14 19 corporations they work for should not manipulate
12:08:17 20 research.
12:08:19 21 A. I -- I should think they would -- should not
12:08:22 22 manipulate research results or research data.
12:08:24 23 Q. Yeah. They should not manipulate the
12:08:27 24 results of the data; correct?
12:08:28 25 A. Correct.

12:08:30 1 Q. Okay. You agree that engineers and
12:08:32 2 corporations they work for should not suppress
12:08:35 3 research.

12:08:42 4 A. I think --

12:08:43 5 Well by suppressing research, do you mean
12:08:47 6 suppressing release of information?

12:08:49 7 Q. No. Let's put it this way: If a
12:08:56 8 corporation has a product in the market and the
12:09:02 9 organization or researchers want to do research on the
12:09:08 10 safety of that product, you agree with me that the
12:09:10 11 corporation should not suppress the research on that
12:09:15 12 product dealing with the safety of the product.

12:09:17 13 MR. GOSS: Objection, incomplete
12:09:19 14 hypothetical.

12:09:20 15 A. Well I -- I would hope that would be the
12:09:22 16 case.

12:09:22 17 Q. So you agree with that statement.

12:09:23 18 A. Yes.

12:09:24 19 Q. Okay. You would expect a reasonable,
12:09:36 20 prudent company to identify solutions to potential
12:09:39 21 problems with their products; correct?

12:09:40 22 MR. GOSS: Objection, form.

12:09:41 23 A. I would -- I would expect that.

12:09:44 24 MR. ASSAAD: Basis.

12:09:45 25 MR. GOSS: Vague.

120

12:09:47 1 Q. Did you understand my question?

12:09:48 2 A. Could you repeat it?

12:09:52 3 Q. You would expect a reasonable, prudent

12:09:55 4 corporation to identify solutions to potential

12:09:59 5 problems with their products; correct?

12:10:02 6 A. Yes.

12:10:02 7 Q. You understood the question; correct?

12:10:04 8 A. Yes.

12:10:04 9 Q. And you agree with that statement; correct?

12:10:06 10 A. Yes.

12:10:07 11 Q. And then we just discussed before, in

12:10:14 12 identifying solutions in the initial brainstorming you

12:10:18 13 should not consider cost.

12:10:19 14 A. That's what I said, and I still agree with

12:10:21 15 that.

12:10:21 16 Q. Okay. Engineers and corporations should not

12:10:26 17 ignore research conducted by other scientists with

12:10:29 18 respect to the safety of the company's product. Do

12:10:33 19 you agree with that?

12:10:34 20 MR. GOSS: Object to form, incomplete

12:10:36 21 hypothetical.

12:10:36 22 A. I would think that would be prudent.

12:10:39 23 Q. So you agree with that statement.

12:10:41 24 A. Yes.

12:10:44 25 Q. An engineer should not ignore apparent

121

12:10:53 1 problems; correct?

12:10:58 2 MR. GOSS: Objection, vague.

12:11:00 3 A. Could you define "apparent?"

12:11:01 4 Q. Well if there's a problem they're aware of,

12:11:04 5 an apparent problem, they know of a problem or a

12:11:07 6 potential problem, they should not ignore it.

12:11:09 7 A. Potential problems are difficult to

12:11:11 8 anticipate, so I would -- I would think they should be

12:11:14 9 aware of actual problems that are brought to their

12:11:18 10 attention.

12:11:19 11 Q. So apparent. They should be --

12:11:21 12 They should not ignore an apparent problem.

12:11:23 13 A. If they're aware of a real problem that

12:11:26 14 exists.

12:11:26 15 Q. Okay. Do you agree with me that engineers

12:11:35 16 and corporations should not ignore apparent problems

12:11:44 17 by dismissing or criticizing safety issues raised by

12:11:49 18 peer-reviewed studies?

12:11:51 19 MR. GOSS: Object to form, incomplete

12:11:54 20 hypothetical.

12:11:54 21 A. Can you repeat that, please?

12:11:56 22 Q. Engineers should not ignore apparent

12:11:59 23 problems by dismissing or criticizing safety issues

12:12:04 24 raised by peer-reviewed studies.

12:12:06 25 MR. GOSS: Same objection.

122

12:12:08 1 Q. Do you understand that question?

12:12:09 2 A. I -- I think I do.

12:12:10 3 I think like an engineer should take those

12:12:13 4 into consideration when making any -- any judgments.

12:12:16 5 Q. Well, for example, if a study comes out and

12:12:20 6 states that a company's product is defective or

12:12:31 7 unsafe, a company should not ignore that study.

12:12:37 8 MR. GOSS: Objection, incomplete

12:12:38 9 hypothetical.

12:12:39 10 A. Again, if they're made aware of it, I -- I

12:12:42 11 would agree with that.

12:12:47 12 Q. Now when designing a device, engineers

12:12:59 13 should take into account warnings of other similar

12:13:03 14 devices that are in the market; correct?

12:13:07 15 MR. GOSS: Same objection.

12:13:08 16 A. I think one -- I think one -- one should be

12:13:10 17 aware of potential similar products --

12:13:14 18 Q. Okay.

12:13:14 19 A. -- and -- and issues associated with them.

12:13:16 20 Q. And the warnings of those products given by

12:13:20 21 out -- by those products; correct?

12:13:21 22 A. Again, the --

12:13:21 23 MR. GOSS: Objection to form and lack of

12:13:22 24 foundation. I'd also object that he's not being

12:13:24 25 offered to provide opinions on warnings.

123

12:13:27 1 You can answer if you can.

12:13:29 2 A. Repeat that, please.

12:13:31 3 Q. Engineers should take into account warnings

12:13:33 4 of other similar devices in the field.

12:13:35 5 MR. GOSS: Same objection.

12:13:37 6 A. If they're --

12:13:39 7 It depends how -- how close the other

12:13:41 8 devices are to their device, and again, being aware of

12:13:45 9 any issues that have resulted -- that have developed.

12:13:46 10 Q. Well if you have a forced-air warming device

12:13:49 11 made by 3M and a similar device made by another

12:13:53 12 company that warns of a certain risk, the 3M engineers

12:13:56 13 should be aware of the other device's warnings and

12:13:59 14 determine whether or not they're typical to the device

12:14:04 15 that they're manufacturing; correct?

12:14:06 16 MR. GOSS: Same objection, beyond the scope

12:14:08 17 of what he's being offered to testify to.

12:14:09 18 A. I think a prudent engineer should be aware

12:14:11 19 of that, and whether that makes --

12:14:13 20 The decision has to be made by somebody

12:14:15 21 whether it's really going to affect their product or

12:14:19 22 not.

12:14:19 23 Q. Were you provided any warnings in your

12:14:20 24 review or in the formulation of your opinions with

12:14:23 25 respect to other patient warming devices that are used

12:14:26 1 in the -- that are sold in the -- in the market?

12:14:30 2 A. I may have. I can't recall.

12:14:33 3 Q. Okay. But if you had been provided, that

12:14:38 4 would be on the list of Exhibit E of Exhibit 1 of this

12:14:41 5 deposition; correct?

12:14:42 6 A. It may have just been discussions with

12:14:45 7 counsel.

12:14:45 8 Q. Okay. Well do you recall any type of

12:14:48 9 warnings provided by other manufacturers, sitting here

12:14:50 10 today?

12:14:50 11 A. Not off the top of my head, no.

12:14:54 12 Q. You agree with me that when engineers

12:15:02 13 determine the safety of a device, they should not

12:15:09 14 consider potential litigation.

12:15:14 15 A. I -- I think an engineer should -- should do

12:15:16 16 that, yes.

12:15:17 17 Q. Should not consider potential litigation

12:15:19 18 when determining the safety of a device; correct?

12:15:22 19 A. I think they should make the device as safe

12:15:25 20 as -- as is feasible from an engineering standpoint.

12:15:27 21 Q. Litigation should have nothing to do with

12:15:29 22 that situation; correct?

12:15:31 23 A. I would think not.

12:15:32 24 Q. Okay. Now my understanding is you've only

12:15:42 25 reviewed three articles with respect to the Bair

125

12:15:50 1 Hugger -- with respect to the Bair Hugger; correct?

12:15:51 2 A. I -- I believe that's correct.

12:15:53 3 Q. Okay. And that is going to be the three --

12:15:57 4 the last three items on Exhibit E, correct, of

12:16:01 5 Exhibit 1?

12:16:02 6 A. Let me look at Exhibit 1 here.

12:16:18 7 I believe that's correct.

12:16:22 8 Q. You have not reviewed any of the Andrew Legg

12:16:41 9 studies; correct?

12:16:42 10 A. I have not.

12:16:43 11 Q. And are you aware that Andrew Legg did the

12:16:46 12 particle testing and -- and -- on the Bair Hugger?

12:16:50 13 A. I was not aware of that, no.

12:16:52 14 Q. Okay. You have not reviewed the published

12:16:58 15 literature by Dr. McGovern and Dr. Reed; have you?

12:17:03 16 A. The Reed article at the very end I have.

12:17:05 17 Q. Okay. But that dealt with the -- with the

12:17:12 18 evaluation of the intake filtration; correct?

12:17:14 19 A. Yes.

12:17:16 20 Q. Okay. But you haven't read the McGovern

12:17:19 21 article dealing with neutral buoyancy bubbles as well

12:17:24 22 as infection rates; have you?

12:17:25 23 A. I -- I do not believe so, no.

12:17:27 24 Q. Okay. You have not read an article by

12:17:34 25 Dasari with respect to temperature measurements around

126

12:17:37 1 the operating room or above the surgical table when
12:17:40 2 the Bair Hugger was turned on as compared to when it
12:17:42 3 was turned off; correct?
12:17:43 4 A. I have not.
12:17:44 5 Q. You have not looked at the Sessler article
12:17:50 6 regarding particle tested -- particle testing in a
12:17:59 7 unidirectional operating room in Holland that was
12:18:03 8 actually done, conducted by 3M.
12:18:06 9 MR. GOSS: Object to form.
12:18:07 10 A. I don't -- don't recall that, no.
12:18:13 11 Q. You haven't read the Brandt article;
12:18:17 12 correct?
12:18:17 13 A. No.
12:18:17 14 Q. You haven't read -- have you -- were you
12:18:18 15 provided --
12:18:19 16 Have you read the Huang article on bacteria
12:18:22 17 testing in an operating room when the Bair Hugger is
12:18:24 18 on as compared to when the Bair Hugger is off?
12:18:27 19 A. No, I have not.
12:18:27 20 Q. Have you read the Moretti article, which is
12:18:30 21 a similar article doing bacterial testing -- or
22 biological testing in an operating room when the Bair
23 Hugger is on as compared to when the Bair Hugger is
24 off?
12:18:36 25 A. No, I have not.

12:18:38 1 Q. By the way, these were all peer-reviewed
12:18:41 2 literature. You're aware of that; correct?
12:18:42 3 A. If you say that. I'm not aware of the
12:18:44 4 citations.
12:18:45 5 Q. Have -- have you reviewed the letter by
12:18:48 6 Farhad Memarzadeh --
12:18:50 7 MS. ZIMMERMAN: Memarzadeh.
12:18:51 8 MR. GOSS: Memarzadeh.
12:18:52 9 Q. -- Memarzadeh that was a letter to the
12:18:54 10 editor of the Moretti article talking about his CFD
12:18:58 11 analysis?
12:18:58 12 A. No, I have not.
12:18:59 13 Q. Have you --
12:19:01 14 Were you provided with an e -- an internal
12:19:03 15 e-mail by 3M talking about whether or not air goes
12:19:08 16 through -- gets into the system or bypasses the filter
12:19:14 17 when it gets into the -- to the Bair Hugger system?
12:19:17 18 Are you aware of that e-mail?
12:19:18 19 A. I do not recall that, no.
12:19:19 20 Q. Okay. Were you provided schematics of -- of
12:19:22 21 the Bair Hugger and the tolerances of where the filter
12:19:26 22 fits in, where the seat of the filter is?
12:19:28 23 A. I do not recall seeing tolerances of the
12:19:31 24 filter, filter fit or -- no.
12:19:33 25 Q. So when you're determining whether or not

128

12:19:35 1 the filter is appropriate for the Bair Hugger in your
12:19:38 2 opinions, you're not taking into account whether or
12:19:40 3 not the filter is seated well into the Bair Hugger;
12:19:43 4 correct?

12:19:43 5 A. I've actually looked at -- at both models of
12:19:46 6 Bair Hugger, the earlier one and the later one, and
12:19:49 7 I've taken the filters out and put them back in, so I
12:19:51 8 know what the seals are like, and in my best
12:19:54 9 professional opinion they are well sealed.

12:19:56 10 Q. So you -- so you believe -- it's your
12:19:57 11 opinion that the 505 --

12:19:59 12 You looked at the 505 and the 750?

12:20:01 13 A. I believe it was the 775.

12:20:03 14 Q. 775, which has similar indications with the
12:20:06 15 750.

12:20:06 16 A. Yes.

12:20:07 17 Q. So you looked at the 505 filter?

12:20:10 18 A. Yes.

12:20:11 19 Q. And it's your opinion that the -- the --
12:20:11 20 all the air that goes -- that comes out of the Bair
12:20:14 21 Hugger is filtered through the filter?

12:20:15 22 A. In the 505 there's some other holes near the
12:20:18 23 top of the case which may communicate between the
12:20:24 24 out -- outside air and in -- inside of the case. I'm
12:20:27 25 not prepared to -- to state definitively everything

129

12:20:31 1 goes through the filter.

12:20:32 2 Q. Well if -- if air that is blown through the

12:20:36 3 Bair Hugger device is not 100 percent filtered through

12:20:45 4 the filter, would you agree with me that that's a

12:20:47 5 design defect?

12:20:50 6 A. Not necessarily.

12:20:51 7 Q. Why not?

12:20:52 8 A. Because filters are lost in other parts of

12:20:56 9 the system even if they do pass the filter.

12:20:59 10 Q. You said filter is lost in other --

12:21:01 11 A. Par -- particles are lost in other parts of

12:21:05 12 the airflow path before they leave the system through

12:21:09 13 the holes in the blankets.

12:21:10 14 Q. When you say they're lost to the air --

12:21:12 15 airflow path, what do you mean by that?

12:21:14 16 A. They're deposited on various surfaces as

12:21:18 17 they're carried along by the airflow if they were to

12:21:21 18 pass the filter.

12:21:31 19 Q. Can you -- did you test --

12:21:32 20 Did you take apart the Bair Hugger, or just

12:21:35 21 took off the filter?

12:21:36 22 A. I took off the filter.

12:21:38 23 Q. Okay. And that's both the 750 and the 775?

12:21:41 24 A. That's correct.

12:21:41 25 Q. Okay. And did you test to see whether or

12:21:46 1 not there was any leakage in the 775?

12:21:49 2 A. I did no tests for leakage, no.

12:21:59 3 Q. Okay. Have you looked at other patient

12:22:01 4 warming devices?

12:22:02 5 A. I have not.

12:22:03 6 Q. Have you -- have you looked at the older

12:22:04 7 models of the Bair Hugger, the 200 series?

12:22:07 8 A. No, I have not.

12:22:08 9 Q. Have you looked at the Mistral that uses a

12:22:10 10 HEPA filter?

12:22:11 11 A. I have not.

12:22:12 12 Q. Are you aware that other patient warming

12:22:15 13 devices use a HEPA filter?

12:22:16 14 A. I have heard that that -- that unit does.

12:22:19 15 Q. So you're aware that the Mistral uses a HEPA

12:22:21 16 filter.

12:22:22 17 A. I -- I've -- I've been told by counsel.

12:22:24 18 Q. Okay. Are you aware that the Warmtouch --

12:22:26 19 Are you aware of the Warmtouch device?

12:22:29 20 A. I am not.

12:22:30 21 Q. Are you aware that that device uses a HEPA

12:22:32 22 filter?

12:22:32 23 A. I'm not aware of that.

12:22:52 24 Q. In your results, would you agree with me

12:23:06 25 that you did not perform a -- an analysis to determine

12:23:10 1 whether or not the values that you've obtained were
12:23:13 2 statistically significant; correct?

12:23:14 3 A. I did not do a statistical analysis, that --
12:23:19 4 that's correct.

12:23:20 5 Q. So would you agree with me that a -- a peer-
12:23:23 6 reviewed article that actually did calculations to see
12:23:26 7 whether the results are statistically significant have
12:23:29 8 more weight than your expert report on the same
12:23:32 9 issues?

12:23:34 10 A. It really depends on the expertise of the
12:23:36 11 researchers and the reviewers as to whether the
12:23:40 12 methodology was correct, the results are -- are
12:23:43 13 correct.

12:23:43 14 Q. But you don't know one way or the other
12:23:45 15 sitting here today; correct?

12:23:46 16 A. Without -- without looking at the -- at
12:23:49 17 actual reports and reviewing them myself, no.

12:23:51 18 Q. And you were not provided any of those
12:23:53 19 reports or literature by 3M; correct?

12:23:55 20 A. Other than what's listed in my list, no.

12:24:03 21 Q. Were you aware that in the older models of
12:24:13 22 Bair Hugger, that they actually warned for airborne
12:24:18 23 contamination when using the Bair Hugger?

12:24:19 24 A. I was not aware of that.

12:24:20 25 Q. Would that affect your opinions in this

132

12:24:22 1 case?

12:24:22 2 A. I do not think so.

12:24:30 3 Q. Did you re -- did you review the 510(k)

12:24:35 4 application for the 505 that was submitted to the FDA?

12:24:38 5 A. I have not seen that, no.

12:24:40 6 Q. Would it surprise you that in the 510(k)

12:24:43 7 application they actually warned, as one of the

12:24:46 8 warnings of the device, that there was a risk of

12:24:49 9 airborne contamination?

12:24:51 10 A. I -- I have -- I have no opinion on that. I

12:24:54 11 have not read the document.

12:24:55 12 Q. I understand that. But would you be --

12:24:57 13 Would that affect your opinions in any way?

12:24:59 14 A. No.

12:25:01 15 Q. Okay. So the mere fact that 3M admits that

12:25:09 16 when the Bair Hugger is on, every single study

12:25:13 17 indicate more particles and that they've warned about

12:25:15 18 airborne contamination in older devices as well as the

12:25:19 19 505 to the FDA, that would have no bearing on your

12:25:22 20 opinions in this case.

12:25:23 21 MR. GOSS: Objection to form.

12:25:24 22 A. Not -- not based on the -- the information

12:25:28 23 I've reviewed.

12:25:29 24 Q. And it is possible that your methodology is

12:25:33 25 incorrect and the other ones are correct in --

12:25:35 1 MR. GOSS: Objection.

12:25:36 2 Q. -- in getting the results; correct?

12:25:38 3 MR. GOSS: Object to form.

12:25:39 4 A. It -- it's possible.

12:25:40 5 Q. I mean you did not perform any statistical

12:25:43 6 analysis to see whether or not your results were even

12:25:46 7 statistically significant; correct?

12:25:47 8 A. As I said before, I did not do any

12:25:49 9 statistical analysis.

12:25:50 10 Q. You only -- you only took one temperature

12:25:55 11 measurement for each of the times listed on Exhibit B;

12:25:57 12 correct?

12:25:57 13 A. That's not correct. I took multiple

12:25:59 14 temperature measurements at some locations.

12:26:03 15 Q. Yeah. But you listed the different times of

12:26:03 16 those temperature measurements; correct?

12:26:05 17 A. Yes.

12:26:06 18 Q. Okay. And you did not --

12:26:07 19 You only did one test; correct? You didn't

12:26:09 20 do this multiple times; correct?

12:26:11 21 A. One -- one day.

12:26:12 22 Q. One day. Okay.

12:26:13 23 By the way, who is the patient who was

12:26:16 24 laying down on the -- on the -- in -- on the table?

12:26:18 25 A. It's a mannequin. I don't remember his

12:26:20 1 name.

12:26:20 2 Q. Okay. So it was a mannequin?

12:26:22 3 A. Yes.

12:26:23 4 Q. Okay. Now according to your results, you

12:26:38 5 would not expect increased particles over the surgical

12:26:42 6 site when the Bair Hugger is turned on; correct?

12:26:44 7 A. That's correct.

12:26:50 8 Q. You understand that particles are very

12:26:58 9 important to surgeons in an operating room; correct?

12:27:01 10 A. I would think a subcategory of particles

12:27:04 11 would be if they're carrying bacteria, yes.

12:27:06 12 Q. I understand that. But if you have zero

12:27:08 13 particles, you're going to have zero bacteria.

12:27:11 14 MR. GOSS: Objection.

12:27:12 15 Q. A bacteria is a particle; correct?

12:27:13 16 MR. GOSS: Object to form.

12:27:14 17 A. Well aerosolized bacteria is an aerosol

12:27:18 18 particle, yes.

12:27:18 19 Q. Okay. And -- and I mean even in a clean

12:27:21 20 room, that's why you check for particles because

12:27:23 21 you -- you know, you might not know what the particle

12:27:26 22 is, but it may -- may or may not be something bad;

12:27:29 23 correct?

12:27:29 24 A. Yes.

12:27:29 25 Q. Okay. Same thing in an operating room. You

12:27:31 1 want to reduce the --

12:27:32 2 The purpose of an operating room is to

12:27:34 3 reduce the number of particles over the surgical site

12:27:36 4 because that's the belief, that if you reduce

12:27:38 5 particles, you're going to reduce colony-forming units

12:27:41 6 over the surgical site; correct?

12:27:43 7 MR. GOSS: Object to form.

12:27:43 8 A. That -- that's one of the intents of a

12:27:45 9 clean -- of an operating room, yes.

12:27:47 10 Q. What's the other?

12:27:48 11 A. To maintain surfaces as -- as clean as

12:27:51 12 possible in addition just to the air.

12:27:54 13 Q. Okay. And the -- the surface of the air,

12:27:57 14 you want to reduce particles because particles carry

12:27:59 15 bacteria.

12:28:00 16 A. Air can contain bacteria-laden particles,

12:28:03 17 yes.

12:28:05 18 Q. Okay. And do you agree that if an engineer

12:28:18 19 is aware that the Bair Hugger device can -- has -- has

12:28:27 20 a risk of airborne contamination in the operating

12:28:30 21 room, it would be unethical for the engineer not to

12:28:32 22 warn the doctors of the potential airborne

12:28:34 23 contamination?

12:28:35 24 MR. GOSS: Objection to form, beyond the

12:28:38 25 scope of his opinions in this case.

12:28:40 1 A. Again, the engineer is working in a group,

12:28:45 2 typically a design group with management, safety

12:28:49 3 people. I'm not sure how much information would

12:28:52 4 actually be obtained by the -- by the engineer and how

12:28:55 5 the engineer would -- would know how to respond.

12:28:57 6 Q. Well let's take it as a corporation then. A

12:29:01 7 corporation --

12:29:01 8 It would be unethical for a corporation not

12:29:03 9 to warn a consumer of a device of potential risks;

12:29:08 10 correct?

12:29:08 11 MR. GOSS: Same objections.

12:29:09 12 A. Depends on what the perceived risks would be

12:29:12 13 and -- and how important they would be to the -- to

12:29:16 14 the product.

12:29:16 15 Q. Well, so if 3M informs the FDA that there's

12:29:19 16 a potential for airborne contamination in using the

12:29:22 17 device but they didn't warn the consumers, the doctors

12:29:26 18 of the hospitals, of the potential risk, that would be

12:29:28 19 unethical; correct?

12:29:30 20 MR. GOSS: Same objection, lack of

12:29:32 21 foundation, --

12:29:33 22 A. Again, it --

12:29:34 23 MR. GOSS: -- assumes facts.

12:29:35 24 A. It would depend on the level of risk.

12:29:37 25 Q. Okay. And to understand the level of risk,

12:29:47 1 you would have to understand the requirements of the
12:30:09 2 orthopedic surgeon in this case with respect to what
12:30:14 3 would be a risk that would be acceptable.

12:30:15 4 MR. GOSS: Same objection.

12:30:18 5 A. Again, I'm not sure who would make the
12:30:20 6 judgment call as to what -- what risk would be
12:30:23 7 acceptable or not.

12:30:37 8 Q. Well you agree with me that engineers and --
12:30:41 9 and the corporations they work for should not hide
12:30:46 10 danger from the customers that purchase their
12:30:50 11 products; correct?

12:30:53 12 A. Again, as -- as with danger, I think it
12:30:55 13 would be what level of -- of danger. There is almost
12:30:58 14 danger in every product, so it's a question of what --
12:31:01 15 what's sufficient to alert potential users.

12:31:03 16 Q. And that's why we have warnings; correct?

12:31:05 17 A. Yes.

12:31:15 18 (Ms. Banthia enters the deposition room.)

12:31:15 19 MR. GOSS: Do you want to go off the record
12:31:16 20 for just a second?

12:31:17 21 MR. ASSAAD: Sure.

12:31:18 22 THE REPORTER: Off the record, please.

13:25:28 23 (Luncheon recess taken.)

24

25

13:25:28 1 AFTERNOON SESSION

13:25:29 2 BY MR. ASSAAD:

13:25:32 3 Q. Are you ready to continue?

13:25:33 4 A. I am.

13:25:34 5 Q. Before we begin, is there anything that you

13:25:40 6 want to change in your testimony that's been given to

13:25:44 7 date -- given to date at this time?

13:25:46 8 A. Not that I know of, no.

13:25:50 9 Q. Okay. Now you agree with me that an

13:26:06 10 engineer or a company should not hide relevant

13:26:09 11 information from customers; correct?

13:26:12 12 A. Well I guess it depends on what you mean by

13:26:14 13 "relevant."

13:26:16 14 Q. Well if -- if there's certain information

13:26:19 15 that a customer wants regarding, say, for example,

13:26:22 16 filtration efficiency of the Bair Hugger filter, 3M

13:26:29 17 should not hide that information from them; correct?

13:26:31 18 MR. GOSS: Objection, form.

13:26:32 19 A. It would de -- it would depend on whether

13:26:39 20 there's competitive issues between different product

13:26:42 21 manufacturers; for example, one would not want to

13:26:45 22 release proprietary information that may give them a

13:26:49 23 competitive disadvantage.

13:26:50 24 Q. Are you aware of any situation where a

13:26:52 25 filter efficiency used in a product is proprietary

13:26:54 1 information?

13:26:55 2 MR. GOSS: Objection to form, foundation.

13:26:58 3 A. I -- I cannot think of anything, no.

13:27:00 4 Q. Okay. And you agree with me that hospitals,

13:27:17 5 when they use medical devices in their operating

13:27:20 6 rooms, might want to know the filter efficiency of a

13:27:23 7 Bair Hugger device; correct?

13:27:24 8 MR. GOSS: Objection to form, foundation.

13:27:26 9 He doesn't work in a hospital.

13:27:28 10 A. I -- I -- again, I don't -- I don't know how

13:27:31 11 to answer that.

13:27:32 12 Q. You've worked on clean rooms before;

13:27:34 13 correct?

13:27:34 14 A. Semiconductor-manufacturing clean rooms.

13:27:38 15 Q. And actually, one of the students

13:27:53 16 actually --

13:27:42 17 You worked -- worked on a case for doing

13:27:43 18 numerical -- a numerical simulation of airflow and

13:27:53 19 airborne pathogen transport in a -- in a operating

13:27:56 20 room; correct?

13:27:56 21 A. It may have been a patient isolation room or

13:28:00 22 patient protection room.

13:28:01 23 Q. Okay. And you're aware -- you're aware

13:28:03 24 that, especially for clean rooms, that filtration and

13:28:06 25 particle -- particle flow are relevant to the company

140

13:28:10 1 that's using the clean room; correct?

13:28:12 2 A. That's the purpose of the clean room, yes.

13:28:14 3 Q. Okay. And the same thing for an operating

13:28:16 4 room, it's relevant information of how well the

13:28:18 5 filtration is and the quality of the filters being

13:28:22 6 used.

13:28:22 7 MR. GOSS: Object to form.

13:28:24 8 A. I'm not --

13:28:25 9 I can't comment on all equipment in the --

13:28:27 10 in the hospital. I can comment on the filters

13:28:30 11 supplying the air to the room.

13:28:31 12 Q. But you understand --

13:28:35 13 Well how does a clean room work?

13:28:37 14 A. Well a clean room tries to provide clean air

13:28:42 15 that meets minimum requirements, and that clean air

13:28:46 16 then passes through the critical areas of -- of the

13:28:48 17 room and hopefully prevent -- prevents contamination.

13:28:52 18 Q. And what would be the critical area in an

13:28:56 19 op -- in a clean room?

13:28:56 20 A. In a semiconductor-manufacturing clean room

13:28:58 21 I'm most familiar with, it's the top surface of the

13:29:01 22 clean bench where wafers are being processed.

13:29:03 23 Q. Okay. And based on your work on this case,

13:29:05 24 what do you consider the critical areas in an

13:29:08 25 operating room?

13:29:09 1 A. I would say the most critical area is
13:29:10 2 probably the surgical zone.

13:29:13 3 Q. What about the table where the equipment
13:29:16 4 sits and the instruments?

13:29:19 5 A. I would say that's not as important as -- as
13:29:21 6 the -- the surgical site.

13:29:24 7 Q. But you believe it's important though.

13:29:26 8 A. I think everything in an OR should be as --
13:29:29 9 as clean as -- as minimum requirements dictate.

13:29:40 10 Q. Now as a manufacturer of -- of the Bair
13:29:43 11 Hugger device, if a customer is evaluating a device to
13:30:00 12 be used in the operating room, such as the Bair
13:30:04 13 Hugger, and wants to know what the filter efficiency
13:30:06 14 is, do you think the company should provide that
13:30:09 15 information to the customer?

13:30:10 16 MR. GOSS: Objection to form, beyond the
13:30:12 17 scope of his opinions.

13:30:15 18 A. As I said before, it depends on what the
13:30:16 19 company perceives to be proprietary information and
13:30:18 20 whether that -- they should divulge that or not.

13:30:21 21 Q. Do you know whether or not 3M perceives the
13:30:25 22 filter efficiency as proprietary?

13:30:28 23 A. I cannot comment on that.

13:30:29 24 Q. Do you know that 3M --
13:30:31 25 You've read the manual for the 775; correct?

142

13:30:34 1 A. Yes.

13:30:34 2 Q. And it states it uses a .2 high-efficiency

13:30:37 3 filter; correct?

13:30:38 4 A. I do not recall that level of detail without

13:30:42 5 seeing a document in front of me.

13:30:45 6 Q. Well in the -- you -- you work --

13:30:49 7 You've worked with ASHRAE 52.2; correct?

13:30:52 8 A. That's correct.

13:30:52 9 Q. And you've actually -- you actually have a

13:30:54 10 test lab for ASHRAE 52.2 that meets the standards of

13:30:58 11 that -- of the testing for the filtration; right?

13:30:59 12 A. That's correct.

13:31:02 13 Q. Okay. When you say "a high-efficiency

13:31:03 14 filter," does that have any meaning in the engineering

13:31:05 15 world?

13:31:07 16 A. In terms of the filtration I'm most familiar

13:31:10 17 with, which is building ventilation filtration, it

13:31:12 18 means a fairly high MERV number.

13:31:14 19 Q. When you say "high MERV number," can you

13:31:17 20 give me a range?

13:31:17 21 A. Probably 13, 14.

13:31:20 22 Q. Okay. And when you say it's a .2

13:31:25 23 high-efficiency filter, what does that mean?

13:31:27 24 A. I am not quite sure what that means. It

13:31:29 25 doesn't relate to the ASHRAE Standard 52.2 that I base

13:31:33 1 most of my research on.

13:31:34 2 Q. So you agree with me that the term "high
13:31:36 3 efficiency" is meaningless without the specification
13:31:38 4 of the size of the particle and the efficiency -- the
13:31:41 5 filtration efficiency for that size; correct?

13:31:43 6 MR. GOSS: Object to form.

13:31:44 7 A. That -- that would be very useful
13:31:50 8 information to have.

13:31:50 9 Q. What?

13:31:51 10 A. That would be very useful information to
13:31:53 11 have.

13:31:53 12 Q. Well if I told you this filter here is high
13:31:56 13 efficiency without knowing for what particle size I'm
13:32:00 14 referring to or the efficiency level for that particle
13:32:02 15 size, "high" -- "high efficiency" is meaningless.

13:32:05 16 A. It's -- it's -- it's not quantitative, yes.

13:32:07 17 Q. Okay. So you agree with me that it's
13:32:10 18 meaningless --

13:32:10 19 MR. GOSS: Object to form.

13:32:11 20 Q. -- for people in the field.

13:32:12 21 A. I -- I would say it's not meaningless, it's
13:32:14 22 just not -- not quantified so it could be compared
13:32:17 23 with another filter type.

13:32:19 24 Q. I mean you could be high efficiency for --
13:32:21 25 for particles size -- the size of tennis balls but not

144

13:32:24 1 high efficiency for bacteria; correct?

13:32:27 2 A. That's --

13:32:28 3 Yes.

13:32:28 4 Q. Okay. So there's no really --

13:32:32 5 There's no information, technical

13:32:34 6 information you could get from the term "high

13:32:36 7 efficiency" unless you know for what particle size and

13:32:39 8 the percentage of efficiency; isn't that correct?

13:32:43 9 A. I would need that information to -- to

13:32:47 10 quantify the performance, yes.

13:32:48 11 Q. And you need to quantify it before you could

13:32:53 12 deem it as high efficiency; correct?

13:32:54 13 MR. GOSS: Object to form.

13:32:55 14 A. I would think so, yes.

13:33:00 15 Q. So if you hear the term ".2 high

13:33:06 16 efficiency," does that give you any information -- "a

13:33:09 17 .2 micron high efficiency filter," does that give you

13:33:12 18 any information as to what the efficiency is at .2

13:33:15 19 microns?

13:33:16 20 A. It -- it does not give me any quantitative

13:33:19 21 information, no.

13:33:20 22 Q. Would you consider a filter that only has a

13:33:26 23 60-percent filter efficiency for -- for .2 microns

13:33:31 24 high efficiency?

13:33:33 25 A. Again, the "high efficiency" term depends

145

13:33:35 1 on -- on the size particle it's being used against and
13:33:39 2 what the application is.

13:33:40 3 Q. I'm asking you, a .2 micron filter,
13:33:44 4 high-efficiency filter that only has a 60-percent
13:33:46 5 filter efficiency for .2 microns, do you consider that
13:33:49 6 high efficiency?

13:33:50 7 A. It could be in other ranges of particle
13:33:54 8 sizes, yes.

13:33:54 9 Q. I'm saying for .2 micron.

13:33:56 10 A. Well for only .2 micron, .63 seems a bit
13:34:00 11 low.

13:34:01 12 Q. When you say .63, that's what you've seen in
13:34:04 13 the documents for 3M; correct?

13:34:05 14 A. Yes.

13:34:06 15 Q. Okay. And in fact, that is why ASHRAE came
13:34:26 16 up with the MERV rating, so you could determine the
13:34:30 17 efficiencies for different-size particles based on the
13:34:33 18 MERV rating; correct?

13:34:35 19 A. Yes. The MERV --

13:34:37 20 The Standard 52.2 was developed to
13:34:40 21 determine -- to provide filter efficiency versus
13:34:42 22 particle size, yes.

13:34:43 23 Q. Because that would be important in
13:34:50 24 determining what type of filter would be needed for a
13:34:52 25 certain application when an engineer decides in the

13:34:55 1 design what type of filter to use; correct?

13:34:57 2 A. That's correct.

13:35:01 3 Q. Assuming that 3M admits that every single

13:35:26 4 study performed by 3M or other researchers indicate

13:35:35 5 that when the Bair Hugger is turned on it increases

13:35:40 6 the particles over the surgical site, do you believe

13:35:45 7 that is relevant information that a consumer of the

13:35:49 8 Bair Hugger should know?

13:35:51 9 MR. GOSS: Object to form.

13:35:54 10 A. Just saying the particle concentration is

13:35:57 11 increased does not -- does not infer potential

13:36:04 12 hazards; for example, biological particle-number

13:36:07 13 increase.

13:36:09 14 Q. That wasn't my question, sir. Do you

13:36:13 15 believe the --

13:36:14 16 Do you agree that the consumer of the Bair

13:36:17 17 Hugger is going -- is -- is --

13:36:20 18 3M knows that it's going to be used in an

13:36:22 19 operating room; correct?

13:36:24 20 A. Yes.

13:36:24 21 Q. And the purpose of the operating room as

13:36:25 22 well as the clean room is to reduce the particle

13:36:27 23 counts over the critical areas; correct?

13:36:29 24 MR. GOSS: Object to form.

13:36:29 25 A. You're saying infectious particle counts.

13:36:32 1 Q. Yes. But infections travel on particles;

13:36:36 2 correct?

13:36:36 3 A. Yes.

13:36:36 4 Q. Okay. And that's something relevant to

13:36:40 5 people that design operating rooms and people that use

13:36:44 6 operating rooms; correct?

13:36:45 7 A. Yes.

13:36:45 8 Q. Okay. And the fact that increased

13:36:48 9 particles -- strike that.

13:36:51 10 You would agree with me that surgeons as

13:37:09 11 well as hospitals do not want to increase particles

13:37:13 12 over a surgical site; correct?

13:37:16 13 MR. GOSS: Lack of foundation.

13:37:18 14 A. I -- I really don't -- I --

13:37:21 15 I'm not a surgeon. I don't have an opinion

13:37:23 16 on that.

13:37:23 17 Q. You agree that in clean rooms, the

13:37:30 18 manufacturers that use the clean rooms do not want

13:37:36 19 increased particles over the critical areas; correct?

13:37:40 20 A. That statement is correct, because almost

13:37:41 21 any particle of any size would be detrimental.

13:37:44 22 Q. Okay. Do you know whether or not orthopedic

13:37:53 23 surgeons consider increased particles over the

13:37:58 24 surgical site relevant?

13:38:04 25 A. I -- I have no direct information on that.

13:38:06 1 I'm not an orthopedic surgeon.

13:38:38 2 Q. Well let's assume that orthopedic surgeons

13:38:44 3 care about particles and any increase in particles

13:38:48 4 over the surgical site for this question. Fair

13:38:50 5 enough?

13:38:50 6 A. We'll make that assumption, yes.

13:38:52 7 Q. Okay. Do you agree with me that if 3M is

13:38:55 8 aware that the Bair Hugger increases particles over

13:38:58 9 the surgical site, that that's relevant information

13:39:02 10 they should inform their customers?

13:39:04 11 MR. GOSS: Objection to form.

13:39:05 12 A. Again, following the assumption we've made

13:39:08 13 earlier, yes.

13:39:09 14 Q. Okay. And did you ever look into the

13:39:25 15 issue -- well you've never heard about the --

13:39:27 16 3M never provided any of these studies,

13:39:29 17 correct, --

13:39:29 18 MR. GOSS: Objection, vague.

13:39:30 19 Q. -- regarding particle counts?

13:39:32 20 A. None other than what I've listed in my -- in

13:39:37 21 my report.

13:39:37 22 Q. Well none of the studies listed in your

13:39:39 23 report deal with particle counts over the surgical

13:39:42 24 site; correct?

13:39:42 25 A. I'd have to go back and -- and look to make

149

13:39:43 1 sure.

13:39:44 2 Q. Well are you aware sitting here today that

13:39:46 3 there are any studies --

13:39:47 4 I mean you haven't read the McGovern study;

13:39:50 5 correct?

13:39:50 6 A. That's correct.

13:39:53 7 Q. And you haven't read any of the Legg

13:39:54 8 studies; correct?

13:39:54 9 A. That's correct.

13:39:55 10 Q. Okay. And are you aware that 3M has done no

13:39:57 11 studies internally with respect to whether or not the

13:39:59 12 Bair Hugger increases particle counts?

13:40:01 13 A. I have no information on that.

13:40:02 14 Q. Assuming that when the Bair Hugger is turned

13:40:08 15 on there is an increase in particle counts over the

13:40:13 16 surgical site, does that have any relevance to your

13:40:18 17 opinions?

13:40:20 18 A. Again, as I said, increase of particles

13:40:23 19 could represent a particle that has nothing to do with

13:40:26 20 surgical infections.

13:40:27 21 Q. I'm not talking about surgical infections,

13:40:30 22 I'm talking about the fact that when the Bair Hugger

13:40:32 23 is off there is X amount of particles and when the

13:40:35 24 Bair Hugger is turned on there is X plus Y particles

13:40:38 25 over the surgical site, an increase. Does that have

150

13:40:42 1 any relevance to your opinions today?

13:40:44 2 A. I'd have to look at the reports and the --

13:40:48 3 and the data collected in order to evaluate whether it

13:40:51 4 would be important or not.

13:40:52 5 Q. Well what would you need to look at?

13:40:57 6 A. I would need to look at their methodology

13:40:59 7 and their data-collection techniques and -- and data

13:41:04 8 reduction.

13:41:05 9 Q. Are you familiar with TSI?

13:41:07 10 A. I am.

13:41:07 11 Q. Are you -- are you -- are you familiar with

13:41:09 12 their particle counters?

13:41:10 13 A. Yes.

13:41:13 14 Q. Do you think they're accurate particle

13:41:13 15 counters?

13:41:14 16 A. When they're used appropriately and --

13:41:17 17 Yes.

13:41:17 18 Q. Okay. And if -- you agree --

13:41:19 19 And if the setup is identically -- is

13:41:21 20 identical, so the particle counter is in the same

13:41:27 21 place, same setup in an operating room, the only

13:41:28 22 difference is Bair Hugger off and Bair Hugger on, and

13:41:30 23 you see an increase, would that -- would that affect

13:41:36 24 your opinions in this case?

13:41:38 25 A. No.

13:41:39 1 Q. Why not?

13:41:41 2 A. Because I don't think it has -- has a

13:41:43 3 bearing on the infectious particles that are going to

13:41:47 4 be causing the concern associated with this case.

13:41:50 5 Q. But sitting --

13:41:50 6 Why do you say it doesn't have a bearing on

13:41:53 7 the infectious particles? What's your basis behind

13:41:56 8 that?

13:41:57 9 A. Because an increase in particle size -- or

13:41:59 10 increase in particle numbers, again not being defined

13:42:01 11 at this point, could be just increases in very small

13:42:05 12 particles, which is perhaps the case, with -- with

13:42:08 13 nothing -- nothing correlated to hospital infections.

13:42:11 14 Q. But you're not a hospitalist or an

13:42:13 15 infectious disease expert; correct?

13:42:15 16 A. I'm not, yes.

13:42:16 17 Q. But would it at least indicate to you that

13:42:18 18 the Bair Hugger has an effect on the HVAC system in

13:42:22 19 the operating room?

13:42:23 20 MR. GOSS: Object to form, --

13:42:25 21 A. It --

13:42:26 22 MR. GOSS: -- calls for speculation.

13:42:27 23 A. It may have.

13:42:28 24 Q. Well from an engineering standpoint, I have

13:42:33 25 X amount of particles with the Bair Hugger off over

152

13:42:35 1 the surgical site, I turn the Bair Hugger on and there
13:42:37 2 is a significant increase in particles, statistically
13:42:40 3 significant, --
13:42:41 4 Okay?
13:42:41 5 A. Okay.
13:42:42 6 Q. -- what would be the cause of that?
13:42:44 7 A. Again, if it's a carefully controlled study,
13:42:49 8 it -- it could be sole -- solely due to the Bair
13:42:51 9 Hugger.
13:42:51 10 Q. Well if the only difference is Bair Hugger
13:42:54 11 off, Bair Hugger on, that's the only thing that's
13:42:56 12 changed, what other cause could it be?
13:42:58 13 MR. GOSS: Objection, incomplete
13:42:59 14 hypothetical.
13:43:00 15 A. Again, it could be differences in other --
13:43:03 16 other conditions.
13:43:05 17 Q. Well the only condition that's changed is
13:43:07 18 the Bair Hugger on and Bair Hugger off. What other
13:43:11 19 conditions could change in an operating room?
13:43:11 20 A. Again --
13:43:13 21 MR. GOSS: Object to the form.
13:43:14 22 A. Again, the methodology used could bias the
13:43:20 23 particle counts towards -- towards one size or
13:43:22 24 another. So total particle counts coming into the
13:43:27 25 sampler could remain the same, but their size is

13:43:30 1 different. That could result in different outputs
13:43:32 2 from the -- from the instrument.

13:43:34 3 Q. Have you ever heard of a DIN standard?

13:43:39 4 A. Yes.

13:43:39 5 Q. Have you -- have you heard of the DIN
13:43:39 6 standard before today -- before getting involved in
13:43:42 7 this case?

13:43:42 8 A. Yes.

13:43:43 9 Q. How do you know about the DIN standard?

13:43:45 10 A. I'm -- I'm peripherally aware of it. I
13:43:47 11 don't know very much about the details.

13:43:48 12 Q. Okay. Have you reviewed the DIN standard
13:43:51 13 before?

13:43:51 14 A. I don't believe I have.

13:43:52 15 Q. Well do you have any reason to disagree with
13:43:55 16 its methodology?

13:43:57 17 A. Not having looked at it, no.

13:43:58 18 Q. Okay. And that's a standard that -- that
13:44:02 19 evaluates operating rooms and its effect -- its
13:44:08 20 protective effect of removing particles; correct?

13:44:11 21 A. Again, not --

13:44:12 22 MR. GOSS: Object to form.

13:44:13 23 A. -- having read the document, I don't know.

13:44:17 24 Q. Well assuming the study was properly done
13:44:21 25 and there was an increase in particles as a result of

154

13:44:24 1 the Bair Hugger, is it your testimony today that that
13:44:30 2 has no effect on your opinion that the Bair Hugger has
13:44:32 3 no effect on the airflow in an operating room?
13:44:36 4 MR. GOSS: Asked and answered.
13:44:38 5 A. And I think I've already answered that.
13:44:40 6 Q. Please answer it again.
13:44:42 7 A. I -- I -- I will stand by my opinion.
13:44:45 8 Q. Which is?
13:44:45 9 A. Which is the Bair Hugger has negligible
13:44:48 10 influence on the airflow near the surgical site.
13:44:50 11 Q. That wasn't -- that wasn't my question, sir.
13:44:52 12 Please answer my question.
13:44:54 13 My question is: Assuming that the
13:44:55 14 methodology and the peer-reviewed studies are correct
13:44:58 15 and that there is an increase in particles over the
13:45:03 16 surgical site when the Bair Hugger is on as compared
13:45:05 17 to when it's off, are you saying, your testimony
13:45:09 18 today, that it has no effect on your opinion that the
13:45:12 19 Bair Hugger has a negligible effect on the surgical
13:45:14 20 site?
13:45:15 21 MR. GOSS: Objection to form, calls for
13:45:17 22 speculation without seeing the study.
13:45:19 23 A. Again, I would stand by my -- my testimony.
13:45:22 24 Q. Which is?
13:45:22 25 A. Which is -- which is no.

13:45:25 1 Q. Okay. So it will have no effect on your
13:45:28 2 testimony.

13:45:28 3 A. Yes.

13:45:28 4 Q. Okay. Are you aware that 3M did not want to
13:46:02 5 disclose the filtration level of its filters to its
13:46:04 6 customers?

13:46:05 7 MR. GOSS: Objection to form.

13:46:06 8 A. I -- I did not know that.

13:46:08 9 Q. Do you think that's ethical?

13:46:09 10 MR. GOSS: Objection to form, beyond the
13:46:11 11 scope of his opinions in this case.

13:46:14 12 A. As I mentioned before, it depends on a
13:46:16 13 number of factors, including any proprietary
13:46:18 14 information.

13:46:18 15 Q. You don't think a hospital has a right to
13:46:22 16 know what the filtration of a filter is in a medical
13:46:24 17 device that's used in the operating room?

13:46:26 18 MR. GOSS: Objection to form. He's not here
13:46:28 19 to testify about anybody's rights.

13:46:30 20 Q. Is that what you're saying here?

13:46:34 21 A. Again, I -- I -- I cannot comment on a
13:46:34 22 hospital's position.

13:46:36 23 Q. As a patient, do you think a patient would
13:46:50 24 want to know whether or not a filter is fil --
13:46:53 25 filtering bacteria from a device that blows air on

13:46:58 1 their body during a surgical operation?

13:47:01 2 A. I don't think a patient would have any idea

13:47:04 3 of that, unless they're involved in the procedure

13:47:06 4 somehow.

13:47:58 5 Q. The fact that 3M admits that every study

13:48:02 6 indicates that the Bair Hugger increases the particle

13:48:08 7 count over the sterile -- ster -- sterile field and

13:48:10 8 that they have no internal studies to refute that has

13:48:14 9 no bearing on your opinion today?

13:48:15 10 MR. GOSS: Object to form.

13:48:17 11 A. Not having seen all the studies, no, I can't

13:48:19 12 comment on that.

13:48:20 13 Q. Well this is what 3M admits in a 30(b)(6)

13:48:23 14 corporate representative deposition. They admit that

13:48:26 15 all the studies --

13:48:26 16 They didn't say they're incorrect. They

13:48:29 17 said all the studies indicate this and they have no

13:48:32 18 data to refute that. That has no bearing on your

13:48:34 19 opinion today?

13:48:34 20 MR. GOSS: Objection to form, lack of

13:48:36 21 foundation.

13:48:36 22 A. Again, not having seen the data, I -- I do

13:48:40 23 not want to comment.

13:48:41 24 MR. ASSAAD: I'm not going to mark this, but

13:48:43 25 can we put this on the screen?

13:48:45 1 THE VIDEOGRAPHER: Put it in front of the
13:48:48 2 witness.

13:48:48 3 Q. Take a look at the highlighted area and read
13:48:54 4 it aloud for the record.

13:48:59 5 A. Okay. I'm reading what -- what it says,
13:49:01 6 page 258. It says:

13:49:05 7 "Q. Okay. Based on the data that we have
13:49:07 8 today, including the study funded by 3M as well as
13:49:12 9 other studies, every single study indicates that the
13:49:14 10 Bair Hugger increases the particle count over the
13:49:16 11 sterile field; correct?"

13:49:20 12 This is A. in bold: "In absolute numbers,
13:49:25 13 yes."

13:49:26 14 And then: "Q. Yes. Okay. And you have no
13:49:31 15 internal studies to refute that; correct?"

13:49:34 16 And there's "A. No, we don't."

13:49:36 17 Q. And you're sitting here today and your
13:49:38 18 testimony is that as a corporate statement by 3M under
13:49:44 19 penalty of perjury in this litigation, that in -- that
13:49:48 20 information would have no effect on your opinion today
13:49:50 21 whether or not the Bair Hugger has any effect on the
13:49:55 22 airflow in an operating room.

13:49:56 23 MR. GOSS: Asked and answered.

13:49:59 24 A. I would request to see the actual results
13:50:01 25 myself.

13:50:05 1 Q. Did you ask for the -- any data?

13:50:07 2 A. I did not know they existed, so no, I did

13:50:11 3 not ask for them.

13:50:15 4 Q. It's not enough for you that 3M admits it

13:50:19 5 in a -- in a -- under penalty of perjury?

13:50:21 6 MR. GOSS: Objection to form, asked and

13:50:22 7 answered.

13:50:23 8 A. I think I've answered that already.

13:50:26 9 Q. So it's not important that 3M admits it to

10 you?

13:50:31 11 Well is there anything that -- let --

13:50:32 12 Let's be honest, doctor. It's quite clear

13:50:35 13 that you're finding out for the first time other

13:50:38 14 studies and other information regarding the issues in

13:50:42 15 this case that have not been provided to you; correct?

13:50:46 16 MR. GOSS: You can answer.

13:50:48 17 A. Yes.

13:50:48 18 Q. And you agree that to be objective in

13:50:58 19 formulating opinions, that you should have all the

13:51:02 20 studies and all the information relevant to the issues

13:51:04 21 of your opinions; correct?

13:51:07 22 A. All the information that -- that I think is

13:51:10 23 important, yes.

13:51:11 24 Q. And other studies by 3M as well as other

13:51:15 25 researchers regarding the effect of the Bair Hugger on

159

13:51:19 1 the airflow in an operating room is relevant in this
13:51:22 2 case; isn't it?

13:51:23 3 A. Yes.

13:51:24 4 Q. Especially ones done by 3M, which you can't
13:51:29 5 even claim any bias towards because it was conducted
13:51:32 6 and funded by 3M.

13:51:32 7 MR. GOSS: Objection to form.

13:51:33 8 Q. Do you agree?

13:51:34 9 A. I agree there's -- there's no bias
13:51:38 10 associated with that.

13:51:38 11 Q. Okay.

13:51:47 12 (Kuehn Exhibit 7 was marked for
13:52:22 13 identification.)

13:52:22 14 BY MR. ASSAAD:

13:52:25 15 Q. Marked as Exhibit 7 is an e-mail chain
13:52:28 16 between Michelle Stevens, Mark Scott, Ms. Soria, Scott
13:52:35 17 Waite, and Mark Morken.

13:52:36 18 I -- I assume, Dr. Kuehn, that you've never
13:52:39 19 seen this document before; correct?

13:52:40 20 A. That's correct.

13:52:41 21 Q. Okay. If you want a --

13:52:57 22 Do you want a minute to review this
13:52:59 23 document, or I'll just ask you some questions?

13:53:02 24 A. Let me just quickly page through it.

13:53:17 25 MR. GOSS: Looks like it starts on --

160

13:53:19 1 The first message is on page 89, the one
13:53:24 2 ending in 89.

13:53:35 3 A. Okay.

13:53:40 4 Q. I want you to read the sentence regarding --

13:54:00 5 from Mark Morken to Scott Waite and Michelle Stevens.

13:54:04 6 It states on the second line --

13:54:06 7 A. Wait. Where are you?

13:54:07 8 Q. First page.

13:54:13 9 Well first of all, if you look at the

13:54:15 10 subject, it states "Message to address safety and

13:54:17 11 efficacy of forced air warming." Do you see that?

13:54:19 12 A. At the top of the first page, yes.

13:54:22 13 Q. Yes. And I -- and I -- and I represent this

13:54:26 14 is --

13:54:26 15 They're discussing whether or not to do the

13:54:28 16 study to determine the safety and efficacy of forced-

13:54:31 17 air warming in this e-mail, based on the subject.

13:54:35 18 A. Something dealing with safety and efficacy,

13:54:38 19 yes.

13:54:38 20 Q. And the response by 3M is, "What are -- What

13:54:40 21 are his findings and own data? Also we would need to

13:54:43 22 really understand what type of study is being

13:54:46 23 proposed. Giving -- Given the ongoing legal

13:54:52 24 situation, decisions were made previously (at a high

13:54:53 25 level) not to pursue clinical research work on this

13:54:56 1 topic."

13:54:57 2 A. I see that.

13:54:57 3 Q. Did I read that correctly?

13:55:00 4 A. Yes.

13:55:00 5 Q. Remember we talked about previously that it

13:55:02 6 would be unethical for an engineer to -- to not do

13:55:09 7 research regarding the safety of a device solely based

13:55:14 8 on litigation?

13:55:15 9 MR. GOSS: I'm going to object to form on

13:55:18 10 the ground that he's not offering any opinions on

13:55:19 11 clinical research or research ethics or engineering

13:55:23 12 ethics.

13:55:25 13 Q. Do you recall that conversation?

13:55:27 14 A. I do.

13:55:28 15 Q. Do you agree with me that for a company to

13:55:33 16 allow litigation to -- to prevent them from doing

13:55:36 17 research on the safety and efficacy of a device is

13:55:39 18 unethical?

13:55:40 19 MR. GOSS: Also going to object to lack of

13:55:42 20 foundation with this document.

13:55:45 21 A. Well again, "decisions were made...(at a

13:55:47 22 high level)...." I don't -- I don't see the direct

13:55:50 23 correlation to any engineers there.

13:55:54 24 Q. So if it's not an engineer it could be

13:55:58 25 ethical, but if it's an engineer it could be

162

13:56:02 1 unethical; is that your testimony?

13:56:05 2 MR. GOSS: Same objection, it's also

13:56:05 3 argumentative.

13:56:05 4 A. I thought you were referring to engineering

13:56:06 5 ethics.

13:56:07 6 Q. Well engineers make devices; correct?

13:56:09 7 A. Yes.

13:56:09 8 Q. Okay. So assuming that there are engineers

13:56:16 9 at a higher level, do you agree that it would be

13:56:19 10 unethical to -- to not pursue research on the safety

13:56:23 11 and efficacy of a device based on -- on an ongoing

13:56:27 12 legal situation?

13:56:28 13 MR. GOSS: Same objections.

13:56:30 14 A. The last sentence says, "Given the ongoing

13:56:32 15 legal situation..." I'm not aware of the legal issues

13:56:37 16 that would be involved in this and how that would play

13:56:41 17 into the -- the decision.

13:56:42 18 Q. It's this case. That's the legal situation.

13:56:44 19 Okay?

13:56:44 20 A. Yes.

13:56:45 21 Q. Assume that. And assume it says "not to

13:56:47 22 pursue clinical research work on this topic," and we

13:56:51 23 could agree that the topic is "Message to address

13:56:53 24 safety and efficacy of forced air warming."

13:56:55 25 MR. GOSS: Object to the witness's complete

13:56:57 1 lack of foundation with this issue.

13:57:03 2 Q. Do you believe such a course of action is

13:57:05 3 ethical? "Yes" or "no."

13:57:13 4 A. Again, without any information on the legal

13:57:16 5 ramifications and the decisions made, I -- I really

13:57:19 6 don't know.

13:57:21 7 Q. So sitting here today, you don't know

13:57:23 8 whether or not, when -- when decisions are made at a

13:57:25 9 higher level not to pursue research on the safety of a

13:57:28 10 device as a result of a legal situation, you have no

13:57:33 11 opinion whether or not that's ethical or not, ethical

13:57:36 12 based on your testimony before?

13:57:37 13 MR. GOSS: Objection, assumes facts not in

13:57:41 14 evidence, in fact contrary to evidence, and lack of

13:57:46 15 foundation.

13:57:54 16 MR. ASSAAD: You can answer the question.

13:57:56 17 A. Again, I have no information on what was

13:57:57 18 being discussed legally regarding this case and how

13:58:01 19 that impacted their decision.

13:58:06 20 Q. Well isn't that contrary to what you stated

13:58:09 21 previously in this deposition?

13:58:11 22 MR. GOSS: Objection, form, mischaracterizes

13:58:13 23 his testimony.

13:58:14 24 Q. Do you want to go to your testimony? Would

13:58:16 25 that be helpful?

164

13:58:18 1 MR. GOSS: What's -- what's the question?

13:58:20 2 A. Yes. What --

13:58:21 3 Q. Remember the question I asked you:

13:58:40 4 Engineers should not take into account -- oh,

13:58:44 5 strike -- strike that.

13:58:45 6 Engineers, in determining the safety of a

13:58:47 7 device, should not consider potential litigation, and

13:58:49 8 you agreed with that statement?

13:58:51 9 A. I -- I -- I may have.

13:58:53 10 MR. GOSS: Improper impeachment.

13:58:58 11 A. I -- I -- I --

13:59:00 12 If it was a statement I made earlier today,

13:59:02 13 I would have to go back and look at the record.

13:59:06 14 Q. Do you think your answer is different now

13:59:08 15 since you've seen this document?

13:59:09 16 MR. GOSS: Objection to form, improper

13:59:11 17 impeachment.

13:59:12 18 A. I don't -- I don't think my answer would be

13:59:15 19 different.

13:59:21 20 Q. Do you remember testifying earlier that a

13:59:47 21 company -- engineers and their company should not

13:59:49 22 suppress research regarding the safety of a device?

13:59:53 23 A. I believe I said that, yes.

13:59:54 24 Q. Okay.

14:00:07 25 (Kuehn Exhibit 8 was marked for

165

14:00:09 1 identification.)

14:00:09 2 BY MR. ASSAAD:

14:00:20 3 Q. Exhibit 8 is an e-mail from Gary Hansen to

14:00:24 4 Dave Westlin, Teri Woodwick-Sides, Jana Stender and

14:00:28 5 John Rock.

14:00:28 6 Do you know any of these people?

14:00:29 7 A. I do not, no.

14:00:35 8 Q. Do you know who ECRI is, E-C-R-I?

14:00:38 9 A. I do not think I know that.

14:00:41 10 Q. I'm just going to read the first line. "Our

14:00:45 11 first step with ECRI should be preventing them from

14:00:49 12 doing their own testing, but rather to rely on

14:00:52 13 published data." Did I read that correctly?

14:00:54 14 A. You read that correctly.

14:00:54 15 Q. Do you think it's good for a company to try

14:00:58 16 to prevent the gaining of knowledge of devices from

14:01:07 17 outside companies that want to do research?

14:01:10 18 MR. GOSS: Objection to form, I don't think

14:01:13 19 that's what this sentence said, and beyond the scope

14:01:16 20 of any opinions he's going to offer in this case.

14:01:19 21 A. I -- I don't know what ECRI refers to.

14:01:21 22 Q. And you weren't provided any documents from

14:01:25 23 the defendant regarding ECRI or the history of -- of

14:01:29 24 the situation with ECRI; correct?

14:01:31 25 A. I was not.

166

14:01:31 1 Q. I'm going to have you assume that ECRI is an
14:01:45 2 independent organization. Do you agree -- assuming
14:01:52 3 that fact, do you agree that one of the goals of 3M in
14:01:56 4 this -- in -- in this e-mail is to prevent ECRI from
14:01:59 5 doing their own testing?

14:02:00 6 MR. GOSS: Objection to form, lack of
14:02:01 7 foundation, assumes facts not in evidence, beyond the
14:02:06 8 scope of any opinions he's going to offer in this
14:02:08 9 case.

14:02:09 10 A. Well I'd -- I'd have to do some
14:02:12 11 interpretation. "Our first step" with this
14:02:14 12 organization that I'm not familiar with, "should be
14:02:15 13 preventing them" -- I'm assuming it's the
14:02:19 14 organization -- "from doing their own testing, but
14:02:23 15 rely on published data," so -- so it sounds to me like
14:02:29 16 they're trying to prevent ECRI from doing some -- some
14:02:34 17 testing; rather, rely on published data.

14:02:38 18 MR. GOSS: You don't have to speculate about
14:02:40 19 what the document says.

14:02:42 20 MR. ASSAAD: Well the document speaks for
14:02:43 21 itself I believe.

14:02:43 22 MR. GOSS: That's right.

14:02:55 23 Q. As -- as an engineer, you agree that -- well
14:03:01 24 strike that.

14:03:01 25 What do you know about Dr. Sessler?

14:03:51 1 A. Not very much I would say. I certainly
14:03:59 2 don't know him personally. I've heard the name.
14:04:03 3 Q. Are you aware that Dr. Sessler has done a
14:04:07 4 lot of work in the area of normothermia?
14:04:11 5 A. I -- I was not aware of that.
14:04:13 6 Q. So what do you --
14:04:14 7 You've heard the name Dr. Sessler before.
14:04:16 8 A. I think perhaps from counsel in this
14:04:18 9 litigation.
14:04:18 10 Q. So what is your knowledge of him besides
14:04:20 11 knowing the name?
14:04:21 12 A. That -- that's about it.
14:04:23 13 Q. Are you aware that Dr. Sessler is on the
14:04:28 14 advisory council for 3M?
14:04:29 15 A. I did not know that.
14:04:30 16 Q. Do you know what an advisory council does?
14:04:33 17 A. Basically, yes.
14:04:34 18 Q. What do they do?
14:04:35 19 A. Provides advice to the company on generally
14:04:38 20 broad issues, broad topics.
14:04:41 21 Q. And companies hire advise -- advisory
14:04:48 22 counsels to offer advice; correct?
14:04:50 23 A. Yes.
14:04:52 24 Q. Okay. Were you aware that -- that Dr.
14:04:56 25 Sessler advised 3M on numerous occasions to perform

168

14:05:00 1 more studies on the safety of the Bair Hugger device?

14:05:04 2 A. I was not aware of that, no.

14:05:05 3 Q. And are you aware that 3M disregarded all

14:05:09 4 the advice that Dr. Sessler has given them regarding

14:05:11 5 that issue?

14:05:12 6 MR. GOSS: Objection to form, contrary to

14:05:13 7 evidence.

14:05:14 8 A. Since I'm not aware of the -- of his

14:05:17 9 comments in the first place, I -- I can't comment on

14:05:20 10 3M's response.

14:05:32 11 (Kuehn Exhibit 9 was marked for

14:05:36 12 identification.)

14:05:36 13 MR. GOSS: Do you have another copy?

14:05:37 14 MR. ASSAAD: Oh, I'm sorry.

14:05:54 15 (Discussion off the stenographic record.)

14:05:59 16 BY MR. ASSAAD:

14:06:06 17 Q. This is an e-mail -- this is --

14:06:11 18 Exhibit 9 is an e-mail from Gary Hansen to

14:06:15 19 Dan Sessler -- or an e-mail chain between Gary Hansen

14:06:20 20 and Daniel -- and Dr. Sessler. Have you seen this

14:06:22 21 document before?

14:06:23 22 A. I have not.

14:06:24 23 Q. Dr. Sessler writes to -- Dr. Sessler writes

14:06:48 24 to Gary Hansen, talks about Scott's paper, and that's

14:06:53 25 Scott Augustine just for the record, "We were lucky

169

14:06:56 1 that this was published at almost the same time as
14:06:59 2 Scott's paper. We may not have warning of his next
14:07:02 3 effort though. There is a very real possibility that
14:07:04 4 he will do some sort of bacterial sampling study (the
14:07:07 5 idea is obvious) and that the first we will know of it
14:07:10 6 is a published paper. If that happens, whatever Scott
14:07:13 7 reports will be un-opposed for one or two years while
14:07:16 8 we do a catch-up study, analysis, and get through the
14:07:19 9 publication process. Waiting much longer seems like a
14:07:22 10 dangerous strategy." And I represent they're talking
14:07:25 11 about doing an aerobiology study.

14:07:29 12 Do you know whether or not 3M has done an
14:07:32 13 aerobiology study on the Bair Hugger?

14:07:34 14 MR. GOSS: Objection to form, foundation.

14:07:36 15 A. I -- I have no idea.

14:07:38 16 Q. Are you aware of any study that indicates
14:07:51 17 that the Bair Hugger device -- peer-reviewed study --
14:07:56 18 does not disrupt the airflow in an operating room?

14:08:01 19 A. Off the top of my head, no.

14:08:08 20 Q. Have you reviewed any articles, were
14:08:12 21 provided any articles of that nature?

14:08:14 22 A. No.

14:08:15 23 Q. Have you been -- have you been provided the
14:08:16 24 compendium created by 3M for marketing its Bair Hugger
14:08:21 25 device discussing all the research available?

14:08:23 1 MR. GOSS: Object to form.

14:08:25 2 A. No.

14:08:25 3 Q. Are you aware that 3M has manipulated

14:08:34 4 studies?

14:08:34 5 MR. GOSS: Objection, form, assumes facts.

14:08:37 6 A. I have -- have no idea. I have not seen

14:08:38 7 the -- the report.

14:09:08 8 (Kuehn Exhibit 10 was marked for

9 identification.)

14:09:11 10 BY MR. ASSAAD:

14:09:11 11 Q. What's been marked as Exhibit 10 is an

14:09:13 12 e-mail chain between Dr. Sessler, Gary Hansen and Russ

14:09:16 13 Olmstead.

14:09:17 14 Do you know who Russ Olmstead is?

14:09:20 15 A. I do not.

14:09:22 16 Q. The first sentence of the top e-mail chain

14:09:48 17 of the second -- the second paragraph, first sentence

14:09:50 18 says, "What clinicians will want to see is basically

14:09:53 19 particle counts under the three test circumstances

14:09:56 20 (Off, Ambient and Warm)." Do you see that?

14:09:59 21 A. I see that.

14:10:00 22 Q. Do you disagree with that statement at all?

14:10:04 23 MR. GOSS: Objection to form, lack of

14:10:05 24 foundation. He's not a clinician.

14:10:08 25 A. I -- I'm not sure what clinicians would want

14:10:11 1 to see.

14:10:13 2 Q. Well you've formulated your opinions to see

14:10:24 3 whether or not the Bair Hugger has an effect on the

14:10:28 4 sterile field in an operating room; correct?

14:10:30 5 A. That's correct.

14:10:31 6 Q. So I assume you have to understand what the

14:10:33 7 issues in this case are; correct?

14:10:34 8 A. Yes.

14:10:35 9 Q. Which is the sterility of the sterile field

14:10:38 10 of an operating room; correct?

14:10:39 11 A. Yes.

14:10:40 12 Q. Okay. So you do agree that physicians want

14:10:44 13 to keep the sterile field as particle-free as

14:10:48 14 possible.

14:10:48 15 A. I would assume so.

14:10:49 16 Q. Okay. And that's not rocket science.

14:10:52 17 That's basically the issues in this case; correct?

14:10:54 18 A. Yes.

14:10:55 19 Q. Okay. I mean you didn't perform your study

14:11:01 20 or your -- your eval -- your opinion in a vacuum. You

14:11:05 21 understood the issues in this case before you

14:11:07 22 performed your study; correct?

14:11:09 23 A. Yes.

14:11:09 24 Q. And you were sent out to prove that the Bair

14:11:12 25 Hugger has a negligible effect on the sterile field in

14:11:15 1 an operating room; correct?

14:11:17 2 MR. GOSS: Objection to form.

14:11:18 3 A. I actually determined that based on my

14:11:21 4 experimental measurements from the Bair Hugger oper --

14:11:24 5 in operation.

14:11:24 6 Q. But that was your working hypothesis;

14:11:27 7 correct?

14:11:27 8 MR. GOSS: Objection to form.

14:11:28 9 A. I was open to whatever the results were

14:11:31 10 that -- that I measured in the lab.

14:11:33 11 Q. But as a scientist, you agree that before

14:11:36 12 you perform any scientific study, you usually have a

14:11:39 13 working hypothesis; correct?

14:11:40 14 A. There's usually some -- some goal that

14:11:42 15 you're working towards.

14:11:45 16 Q. Okay. What was your working hypothesis in

14:11:48 17 this case?

14:11:50 18 A. To measure the actual -- in the lab, measure

14:11:53 19 the actual temperature and airflow rates out of the

14:11:56 20 Bair Hugger and determine if they were significant or

14:12:00 21 strong enough to go around the anesthesial -- anes --

14:12:04 22 anesthesical drape to get to the surgical site.

14:12:09 23 Q. Okay. That's not your hypothesis, that's

14:12:12 24 what you did. What was your hypothesis?

14:12:14 25 A. My hypothesis was that the airflow delivered

14:12:17 1 would have negligible effect on the airflow of the
14:12:20 2 surgical site.

14:12:20 3 Q. Fair enough. So your hypothesis was that
14:12:23 4 the airflow had a negligible effect, and you did your
14:12:26 5 study to prove your hypothesis; correct?

14:12:28 6 MR. GOSS: Object to form.

14:12:31 7 A. The results I think showed that to be
14:12:31 8 correct.

14:12:31 9 Q. I understand that. But now we're both
14:12:33 10 engineers, we've both written papers. You have a
14:12:35 11 hypothesis and then you do your study to prove your
14:12:39 12 hypothesis to see if your hypothesis is correct or
14:12:41 13 not; correct?

14:12:42 14 MR. GOSS: Objection to form.

14:12:43 15 A. I -- I would say I was not -- I was not
14:12:49 16 proving a hypothesis set up ahead of time. I was
14:12:51 17 looking at the data that I collected and then, based
14:12:53 18 on that, determining my -- my position.

14:12:57 19 Q. So you never formulated a hypothesis before
14:12:59 20 you obtained your data.

14:13:01 21 A. I was open-minded in terms of what -- what
14:13:04 22 would happen.

14:13:08 23 Q. So the answer to my question is "correct."

14:13:10 24 MR. GOSS: Objection to form. He answered
14:13:12 25 the question.

174

14:13:12 1 A. I -- I did not have a goal in mind. I -- I
14:13:18 2 did the measurements I -- I performed, and based on
14:13:18 3 the results of the measurements, I used that to
14:13:21 4 support my --

14:13:22 5 Q. And that's --

14:13:22 6 I'm asking you: In your methodology, you
14:13:24 7 did not have a hypothesis before you started taking
14:13:27 8 measurements; correct?

14:13:28 9 A. Yes.

14:13:39 10 Q. I'll represent that Exhibit 10 is discussion
14:13:54 11 between Gary Hansen and Dr. Sessler and Russ Olmstead
14:14:00 12 discussing the Sessler paper of 2011 that 3M funded
14:14:06 13 and performed and which was published regarding
14:14:11 14 particle count using the DIN standard.

14:14:13 15 MR. GOSS: Objection to form.

14:14:14 16 MR. ASSAAD: Basis.

14:14:16 17 MR. GOSS: 3M didn't perform it. 3M
14:14:22 18 definitely funded it.

14:14:29 19 Arizant funded it. Sorry. Arizant funded
14:14:32 20 it.

14:14:35 21 Q. Do you see on the second line of the first
14:14:38 22 paragraph, "The increase with the 635 cover on ambient
14:14:42 23 or warm in Amersfoort seemed substantial, roughly a
14:14:47 24 factor-of-five-to-ten?"

14:14:48 25 A. Where -- where are you again?

14:14:50 1 Q. First paragraph, second sentence.

14:14:52 2 A. Okay.

14:14:53 3 Q. "The increase with the 635 cover on ambient

14:14:57 4 or warm in Amersfoort seemed substantial, roughly a

14:15:00 5 factor-of-five-to-ten."

14:15:03 6 A. I -- I think you --

14:15:05 7 Q. Talking about particles here.

14:15:06 8 A. Well --

14:15:07 9 MR. GOSS: Wait for a question.

14:15:08 10 Q. Do you agree that --

14:15:12 11 Well let me ask you this: The effect

14:15:13 12 that -- withdraw that question.

14:15:20 13 Since you've never read the Sessler article

14:15:24 14 regarding particle counts funded by 3M, you have no

14:15:28 15 idea sitting here today what actually made it into the

14:15:31 16 published paper; do you?

14:15:33 17 A. That's correct.

14:15:38 18 Q. Do you think that if you obtained data that

14:15:41 19 showed that particle counts increased on a factor of

14:15:44 20 five to 10 when the Bair Hugger was ambient or warm,

14:15:46 21 that is a finding that should be published in an

14:15:51 22 objective, impartial study to be peer-reviewed?

14:15:56 23 MR. GOSS: Object to form.

14:15:57 24 A. Potentially, uh-huh.

14:16:04 25 Q. Do you think it's ethical for a company to

176

14:16:20 1 fund research, analyze the data, and then give it to a
14:16:32 2 researcher to publish it?

14:16:33 3 MR. GOSS: Objection to form. He's not an
14:16:35 4 ethicist and he's not offering opinions on ethics.

14:16:38 5 MR. ASSAAD: This whole case is about
14:16:40 6 ethics.

14:16:41 7 A. It -- it's not uncommon for a company to
14:16:44 8 support research that then is sent back to the
14:16:48 9 corporation prior to publication, not for changing any
14:16:54 10 information per se, but there may be again some
14:16:57 11 proprietary issues with something that was -- was used
14:16:59 12 in the study that the company does not want released.

14:17:03 13 Q. But if I understand you correctly, it's okay
14:17:07 14 for the -- the researchers to send back the manuscript
14:17:13 15 to the corporation for them to change --

14:17:16 16 MR. GOSS: Object to form, assumes facts.

14:17:19 17 Q. -- or edit?

14:17:20 18 A. I would say edit.

14:17:21 19 Q. So a corporation is allowed to edit the
14:17:23 20 substance of a research paper that they fund?

14:17:27 21 MR. GOSS: Objection to form.

14:17:27 22 A. Again, in my experience it's very common for
14:17:31 23 a researcher who is funded by a company to have an
14:17:35 24 agreement in writing before that project starts that
14:17:37 25 any information release would have to be approved by

14:17:42 1 the -- the funding agency or the company.

14:17:45 2 Q. I understand the release, but what about

14:17:48 3 editing, editing the content of -- of a manuscript?

14:17:51 4 A. I would say not changing the results. There

14:17:54 5 may be --

14:17:55 6 Again, something proprietary could be in

14:17:57 7 there that the company does not want released, but

14:17:59 8 that should not change the overall results of the

14:18:01 9 study.

14:18:02 10 Q. Okay. So -- so you'll agree with me that

14:18:05 11 a -- a researcher should not send back the manuscript

14:18:09 12 to the corporation that funded the research and give

14:18:12 13 them free reign to do any type of edit they want to

14:18:15 14 do; correct?

14:18:16 15 MR. GOSS: Objection, form, beyond the scope

14:18:18 16 of the opinions.

14:18:18 17 A. That -- that would be my --

14:18:19 18 Yes, I would agree with that.

14:18:21 19 Q. Because if it was done, that would lack

14:18:23 20 integrity in that paper; correct?

14:18:25 21 MR. GOSS: Same objection.

14:18:26 22 A. Well the original researchers would

14:18:29 23 hopefully have integrity. It's a question of what

14:18:32 24 happens after that. I would say that's not a -- that

14:18:35 25 would be a non -- a non-ethical decision.

14:18:39 1 Q. It would not be ethical.

14:18:40 2 A. I agree.

14:18:41 3 Q. Okay. Have you heard of Hybeta?

14:19:08 4 A. I do not believe I have.

14:19:21 5 Q. Does the fact that Dr. Sessler indicated the

14:19:23 6 results show a factor of five to 10 increase in

14:19:26 7 particle counts when the Bair Hugger was on ambient or

14:19:28 8 on high -- or on warm, would that have any effect on

14:19:33 9 your opinions in this case?

14:19:35 10 MR. GOSS: Objection, assumes facts not in

14:19:37 11 evidence.

14:19:37 12 A. Without --

14:19:39 13 Not without having read the article.

14:19:40 14 Q. Okay. Going back to the last exhibit

14:21:29 15 talking about the particle counts being five to 10

14:21:32 16 times, --

14:21:32 17 A. Okay.

14:21:33 18 Q. -- are you aware that 3M deleted that

14:21:37 19 information from the final manuscript submitted for

14:21:40 20 publication?

14:21:40 21 MR. GOSS: Objection to form.

14:21:41 22 A. I have no information on that.

14:21:43 23 Q. Would you -- would that --

14:21:45 24 If that is the case, assuming that's the

14:21:47 25 case, do you agree that's unethical?

14:21:49 1 MR. GOSS: Objection to form, beyond the
14:21:51 2 scope of his opinions. He's not an ethicist.
14:21:53 3 A. Well, I would probably agree with that.
14:21:56 4 Q. Sitting here today, do you have any
14:22:20 5 understanding or -- or -- or knowledge as to why you
14:22:23 6 were not provided most of the relevant peer-reviewed
14:22:30 7 literature in this case?
14:22:30 8 MR. GOSS: Objection, argumentative, calls
14:22:33 9 for speculation.
14:22:35 10 A. I was given a task that was fairly narrow in
14:22:38 11 scope, and that may have limited the amount of
14:22:41 12 information I was given.
14:22:42 13 Q. So your task was narrow in scope?
14:22:44 14 A. Yes, to look -- look at primarily the
14:22:49 15 filter -- filtration issues and -- and particle
14:22:52 16 movement on surfaces, and transport issues.
14:22:57 17 Q. Well you also calculated buoyancy using the
14:23:00 18 Archimedes number to see whether or not there would be
14:23:03 19 any effect on -- on air movement in the operating
14:23:06 20 room; correct?
14:23:06 21 A. That was in response to one of the expert
14:23:09 22 reports.
14:23:10 23 Q. So what -- what analysis did you do with
14:23:13 24 respect for you to come to your conclusion that the
14:23:16 25 Bair Hugger has a negligible effect on the airflow in

180

14:23:19 1 the operating room?

14:23:21 2 A. Based on my measurements of the velocity

14:23:23 3 leaving the blanket primarily.

14:23:25 4 Q. Okay. So it's solely based on your Exhibit

14:23:28 5 B then.

14:23:28 6 A. Yes.

14:23:29 7 Q. That's it.

14:23:29 8 A. And knowledge of how operating rooms

14:23:34 9 typically work with air coming down through the

14:23:37 10 filters in the ceiling towards the surgical wound site

14:23:40 11 and the air from the blanket being emitted, I would

14:23:45 12 say, down -- on the downstream side of the surgical

14:23:49 13 drape.

14:23:49 14 Q. Okay. And we'll get to that in a little

14:23:53 15 bit. But let's talk about operating rooms. So you

14:23:54 16 understand that the --

14:23:55 17 Do you know what the term "environment of

14:23:58 18 use" is?

14:23:58 19 A. Yes.

14:23:59 20 Q. Have you ever used that term before?

14:24:02 21 A. I do not believe I have.

14:24:02 22 Q. Have you ever heard of it before?

14:24:02 23 A. I have heard of it before.

14:24:04 24 Q. And would you agree with me that when

14:24:06 25 designing any device, you have to look at what

14:24:11 1 environment the device is going to be used in;
14:24:13 2 correct?
14:24:13 3 A. That's correct.
14:24:13 4 Q. And you understand that the -- the Bair
14:24:14 5 Hugger is being used in an operating room as well as
14:24:16 6 other areas, but it's also being used in an operating
14:24:19 7 room; correct?
14:24:20 8 A. Correct.
14:24:20 9 Q. Okay. And have you looked at the
14:24:22 10 environment of an operating room with respect to the
14:24:26 11 bacterial load in an operating room?
14:24:28 12 A. I've not personally, no.
14:24:31 13 Q. Could you agree with me that the bacterial
14:24:34 14 load, if we're talking about CFUs per meter cubed, is
14:24:39 15 not uniform throughout the operating room?
14:24:40 16 A. I would agree with that.
14:24:42 17 Q. A certain area is going to have a higher
14:24:45 18 bioburden than other areas; correct?
14:24:46 19 A. Yes.
14:24:46 20 Q. Could you agree with me that probably the
14:24:49 21 most -- the -- the area with the greatest bioburden is
14:24:54 22 probably around the surgical table?
14:25:01 23 A. I --
14:25:02 24 Not having seen any data, I'm -- I'm
14:25:05 25 offering speculation, so I would not have a basis to

14:25:09 1 agree with that.

14:25:09 2 Q. Well will you agree that the bioburden,

14:25:15 3 which is bacteria, are usually coming off of
14:25:20 4 individuals, off their skin, as well as it could have
14:25:25 5 been not cleaned properly before, some areas of the
14:25:28 6 operating room; correct?

14:25:28 7 A. And also coming through the filters in the
14:25:30 8 ceiling.

14:25:31 9 Q. Okay.

10 A. Other --

14:25:33 11 Q. What do you think has a larger bioburden,
14:25:36 12 the air coming out of the ceiling or the air
14:25:41 13 underneath the operating room table?

14:25:45 14 A. I have no basis to make an opinion on that.

14:25:48 15 Q. Okay. So sitting here today, you can't use
14:25:51 16 your -- you can't use science and your engineering
14:25:57 17 education to determine, based on the airflow in an
14:26:01 18 operating room, whether or not the air coming out of
14:26:04 19 the ventilation system has a greater or lesser
14:26:08 20 bioburden than the air where there are a patient and
14:26:16 21 three or four people standing around a surgical table.

14:26:19 22 A. Well I -- I cannot rely on any data, but I
14:26:23 23 can speculate that it would be -- the concentration
14:26:25 24 would be higher under the table.

14:26:26 25 Q. And that would be because air is blowing

14:26:28 1 down through the ventilation and it's moving the
14:26:33 2 bacteria and the squames on a downward motion to the
14:26:37 3 floor; correct?

14:26:37 4 A. Yes.

14:26:38 5 Q. Okay. So you agree with me that from
14:26:42 6 engineering common sense, that the area with the least
14:26:46 7 amount of bioburden is probably the air coming from
14:26:49 8 the vents in an operating room.

14:26:53 9 A. That's certainly one of the areas of low
14:26:56 10 bioburden.

14:26:56 11 Q. Okay. Have you heard the term "war games"
14:27:36 12 used by 3M?

14:27:38 13 A. No.

14:28:35 14 (Kuehn Exhibit 11 was marked for
14:28:41 15 identification.)

14:28:41 16 BY MR. ASSAAD:

14:28:51 17 Q. Exhibit 11 is an e-mail from Jana Stender to
14:28:53 18 John Rock, and attached to it is something called "war
14:28:57 19 games notes.docx." I assume you've never seen this
14:29:04 20 document before; correct?

14:29:04 21 A. That's correct, I have not -- I have not
14:29:06 22 seen this before.

14:29:07 23 Q. Were you aware -- if you look at the bottom
14:29:39 24 of page two, the fifth line up -- that 3M had a
14:29:46 25 concern that someone was going to do a real study on

184

14:29:49 1 forced-air warming and contamination?

14:29:51 2 A. That -- that's what it says here.

14:29:52 3 Q. Okay. Do you agree with me that, based on

14:30:06 4 the information that you've been provided today, that

14:30:12 5 there's no evidence that 3M performed any study to

14:30:23 6 determine whether or not the Bair Hugger contaminates

14:30:26 7 a sterile field?

14:30:27 8 MR. GOSS: Objection to form, lack of

14:30:29 9 foundation, beyond the scope of his opinions.

14:30:33 10 A. Nothing that I've seen today, no.

14:30:35 11 Q. And I assume that information is not

14:30:41 12 important to your opinions; correct?

14:30:43 13 A. Not -- not based on how I developed my

14:30:46 14 opinions.

14:30:51 15 Q. So if your opinions and your calculations

14:30:54 16 are contrary to peer-reviewed studies, you would still

14:30:57 17 stand by your opinions?

14:31:00 18 A. I would say some peer-reviewed studies,

14:31:02 19 especially those dealing with particle measurements,

14:31:05 20 are often flawed because of a poor -- poor methodology

14:31:12 21 or -- or --

14:31:14 22 Q. You're speculating though; correct?

14:31:16 23 MR. GOSS: Objection to form.

14:31:17 24 A. Without -- well, without -- without reading

14:31:20 25 them, I'm speculating, yes.

14:31:21 1 Q. I mean you can't sit here today and say
14:31:23 2 whether or not the Legg study had poor methodology;
14:31:25 3 can you?
14:31:26 4 A. Not --
14:31:26 5 MR. GOSS: Show him the study.
14:31:28 6 MR. ASSAAD: I'm not going to show it to
14:31:29 7 him. You can show it to him. 3M could show it to
14:31:33 8 him.
14:31:33 9 MR. GOSS: Well you're asking him questions
14:31:35 10 about the study and he can only -- he can only
11 speculate --
12 MR. ASSAAD: No.
14:31:36 13 MR. GOSS: -- if you're not going to show
14:31:38 14 him.
14:31:38 15 Q. Sitting here today you cold not state --
14:31:38 16 MR. ASSAAD: I'm sorry, Dick.
14:31:39 17 Q. Sitting here today you could not state
14:31:41 18 whether or not the 3M -- or the Legg study had poor
14:31:43 19 methodology; can you?
14:31:44 20 A. I cannot state that because I've not seen
14:31:46 21 it.
14:31:46 22 Q. Okay. And you --
14:31:48 23 Sitting here today, you could not say
14:31:51 24 whether or not the Sessler study funded by 3M had poor
14:31:53 25 methodology; correct?

14:31:54 1 A. Having not seen it, I could not say that,

14:31:57 2 yes.

14:31:59 3 Q. And you can't sit here today and say the

14:32:01 4 McGovern study that had neutral-buoyant bubbles had

14:32:06 5 poor methodology; can you?

14:32:07 6 A. Not having seen it, no, I cannot say that.

14:32:10 7 Q. Are you aware that Gary Hansen stated in an

14:32:32 8 edit on a paper that there actually is evidence that

14:32:35 9 forced-air warming increases the risk of infection?

14:32:38 10 MR. GOSS: I think she's going to correct

14:32:40 11 you.

14:32:40 12 MR. ASSAAD: I'm sorry, Al Van Duren.

14:32:43 13 MR. GOSS: Object to form.

14:32:44 14 A. I -- I -- I have not seen that.

14:32:46 15 Q. You know Al Van Duren is still with the

14:32:48 16 company 3M; correct?

14:32:49 17 A. I -- I did not know that.

14:32:51 18 Q. Okay. Assuming that Al Van Duren, who is

14:33:13 19 upper-level management at 3M, stated, "Actually, there

14:33:18 20 is evidence that forced-air warming use increases

14:33:22 21 risk -- this evidence was the motivation behind Dr.

14:33:26 22 Memarzadeh's work," assuming that's correct, would

14:33:30 23 that affect your opinions in this case?

14:33:32 24 MR. GOSS: Objection to form.

14:33:33 25 A. Could you repeat that again?

14:33:37 1 Q. Okay. Assuming that Al Van Duren, who is
14:33:40 2 upper-level management at 3M stated, "Actually, there
14:33:44 3 is evidence that forced-air warming use increases
14:33:47 4 risk" -- and they're talking about infections -- "this
14:33:51 5 evidence" -- dash "this evidence was the motivation
14:33:55 6 behind Dr. Memarzadeh's work." Assuming that's
14:33:58 7 correct, would that affect your opinions in this case?

14:34:00 8 MR. GOSS: Same objection.

14:34:01 9 A. I would say no.

14:34:17 10 MR. ASSAAD: Take a five-minute break?

14:34:20 11 MR. GOSS: Sure.

14:42:47 12 (Kuehn Exhibit 12 was marked for
14:42:49 13 identification.)

14:42:49 14 BY MR. ASSAAD:

14:42:54 15 Q. What's been marked as Exhibit 12 are
14:42:56 16 invoices that have been provided to me today which are
14:43:00 17 your March and May invoices to Blackwell Burke; is
14:43:07 18 that correct?

14:43:07 19 A. Yes, that's correct.

14:43:08 20 Q. And with respect to the invoices that we --
14:43:15 21 have been marked in today's deposition, that's all the
14:43:17 22 invoices that you have prepared so far in this case.

14:43:19 23 A. That's correct, February through the first
14:43:21 24 of June.

14:43:22 25 Q. Okay. On May 16th you indicate you

14:43:38 1 "Reviewed 3M report, read ASHRAE HVAC design guide and

14:43:44 2 52.2."

14:43:45 3 A. Yes, I believe that's what it says.

14:43:47 4 Q. What's the ASHRAE HVAC design guide? Is

14:43:50 5 that for hospitals?

14:43:51 6 A. Yes. Yes.

14:43:52 7 Q. Is that the 2007 I think it was?

14:43:55 8 A. I don't remember what version it was, but --

14:43:58 9 Q. Second version?

14:43:59 10 A. It's probably the most recent hospital

14:44:02 11 design guide.

14:44:02 12 Q. Now let's go to your report, which is

14:44:11 13 Exhibit 1. I want to go to Exhibit 1 -- Exhibit A of

14:44:19 14 Exhibit 1, which is your curriculum vitae.

14:44:38 15 A. Okay.

14:44:39 16 Q. Is this the most-up-to-date CV available?

14:44:43 17 A. It was when I submitted it, yes.

14:44:46 18 Q. So back in June?

14:44:47 19 A. I -- I don't recall when I actually

14:44:50 20 submitted it.

14:44:50 21 Q. Okay. Well your expert report is dated June

14:44:53 22 1st, so would that be when you submitted this CV?

14:44:57 23 A. I think I may have as part of the report,

14:45:00 24 yes. Yes.

14:45:01 25 Q. Well have you consulted with anyone that's

14:45:04 1 not on the list that you would add to the CV?

14:45:13 2 A. Certainly not since '87, no.

14:45:18 3 Q. Okay. Under your honors and awards you put

14:45:22 4 down "Minnesota Supercomputer Institute, Associate

14:45:27 5 Fellow 1994."

14:45:27 6 A. Yes.

14:45:28 7 Q. Is there any other supercomputers in

14:45:32 8 Minnesota besides the one at the University of

14:45:34 9 Minnesota that you're aware of?

14:45:37 10 A. That's the only one I'm aware of.

14:45:39 11 Q. Does St. Thomas have a supercomputer?

14:45:43 12 A. I do not --

14:45:44 13 I'm not aware of that, no.

14:45:45 14 Q. Okay. And you have listed here patents, you

14:45:50 15 have three patents on page two. Have those all been

14:45:55 16 assigned to the University of Minnesota?

14:45:56 17 A. The first one was in -- let's see. First

14:46:02 18 one was actually developed when I was at Iowa State

14:46:05 19 University.

14:46:05 20 Q. Okay. So that was assigned to Iowa State?

14:46:08 21 A. That was assigned to Iowa State. The others

14:46:11 22 are the University of Minnesota.

14:46:12 23 Q. Okay. Now you don't hold yourself out as an

14:46:31 24 expert in internal medicine; do you?

14:46:34 25 A. That's correct, I do not.

14:46:36 1 Q. And you don't hold yourself out as an expert
14:46:37 2 in infectious diseases; correct?

14:46:39 3 A. That's true.

14:46:40 4 Q. Sitting here today, you have no opinion of
14:46:42 5 how many CFUs would cause a periprosthetic joint
14:46:49 6 infection; correct?

14:46:50 7 A. I'm not an expert in that area, so yes, I
14:46:52 8 have no opinion on that.

14:46:53 9 Q. Do you know the difference between a
14:46:55 10 periprosthetic joint infection and a superficial wound
14:46:59 11 infection?

14:47:00 12 A. I do not.

14:47:00 13 Q. Okay. You don't hold yourself out as an
14:47:02 14 expert in orthopedics; correct?

14:47:04 15 A. That's -- that's true, I'm not an
14:47:06 16 orthopedics expert.

14:47:06 17 Q. You don't hold yourself out as an expert
14:47:07 18 in -- in nursing; correct?

14:47:08 19 A. That's correct.

14:47:09 20 Q. You don't hold yourself out as an expert in
14:47:11 21 the manufacturing of filters; correct?

14:47:12 22 A. Manufacturing, that's probably correct.

14:47:19 23 Q. Okay. You don't hold yourself out as an
14:47:21 24 expert in medical device design; correct?

14:47:24 25 A. That's correct.

14:47:24 1 Q. You don't hold yourself out as an expert
14:47:27 2 with -- with respect to medical device warnings;
14:47:29 3 correct?

14:47:29 4 A. That's correct.

14:47:31 5 Q. You don't hold yourself out as an expert in
14:47:33 6 anesthesiology; correct?

14:47:35 7 A. That's correct.

14:47:35 8 Q. You don't hold yourself out as an expert in
14:47:39 9 patient warming devices; correct?

14:47:40 10 A. Other than this, the work I've done here,
14:47:45 11 I've -- I've not done any other work in other patient
14:47:50 12 warming devices.

14:47:51 13 Q. Do you know what other patient warming
14:47:53 14 devices are out there in the market?

14:47:54 15 A. You, I think, alluded to some earlier today,
14:47:56 16 but I -- I cannot repeat their names.

14:47:58 17 Q. Have you heard of the Mistral?

14:48:00 18 A. Yes.

14:48:00 19 Q. Have you heard of Warmtouch?

14:48:02 20 A. Yes.

14:48:02 21 Q. Have you heard of the Hot Dog?

14:48:05 22 A. Yes.

14:48:05 23 Q. Have you heard of VitaHEAT?

24 A. I am not --

14:48:05 25 Q. A 3M product.

14:48:06 1 A. I'm not -- not sure I have.

14:48:08 2 Q. Okay. You're not an expert in operating

14:48:10 3 room design; are you?

14:48:11 4 A. No.

14:48:12 5 Q. And you agree that an operating room is

14:48:16 6 different than other areas in the hospital; correct?

14:48:19 7 A. Yes.

14:48:19 8 Q. It's not the same as a PACU; correct?

14:48:21 9 A. Same as -- come again.

14:48:26 10 Q. It's not the same as a PACU.

14:48:27 11 Do you know what a PACU is?

14:48:28 12 A. Will you spell it out?

14:48:30 13 Q. Post Anesthesia Care Unit.

14:48:33 14 A. Oh. Yes, it's different, yes.

14:48:34 15 Q. It's different than an ER -- ER triage

14:48:36 16 center; correct?

14:48:37 17 A. Yes.

14:48:39 18 Q. Do you agree that ASHRAE has different

14:48:41 19 standards for air exchanges in different types of a

14:48:45 20 hospital?

14:48:46 21 A. Yes.

14:48:48 22 Q. Like the OR requires a different air

14:48:51 23 exchange than, say, a patient's room.

14:48:54 24 A. Right. Patient isolation room or some other

14:48:57 25 room, yes.

14:48:58 1 Q. Or regular patient room like a --

14:49:00 2 A. Yes.

14:49:01 3 Q. And also the filtration requirements are

14:49:03 4 different for an OR than other parts of the hospital;

14:49:06 5 correct?

14:49:06 6 A. That's correct.

14:49:07 7 Q. Okay. Because when you determine filtration

14:49:10 8 for a certain room, you have to determine the

14:49:14 9 environment of use of that room; correct?

14:49:16 10 A. That's correct.

14:49:18 11 Q. In an operation --

14:49:19 12 In an operating room, a -- a person's very

14:49:23 13 susceptible to infection because he at that time is

14:49:26 14 immunosuppressed because he basically has a wound

14:49:29 15 that's open to the air; correct?

14:49:30 16 MR. GOSS: Object to form.

14:49:31 17 A. I'm not aware of the details of that.

14:49:34 18 Q. Well you agree with me that you want an

14:49:37 19 operating room to be clean as possible to prevent

14:49:42 20 infections of open wounds; correct?

14:49:44 21 A. Yes.

14:49:48 22 Q. And you don't hold yourself out as an expert

14:49:57 23 in operating room airflow; correct?

14:49:59 24 A. That's correct.

14:50:02 25 Q. Do you know the difference between laminar

194

14:50:09 1 flow and turbulent flow?

14:50:10 2 A. Yes.

14:50:11 3 Q. Do you hold yourself out as an expert

14:50:13 4 between laminar flow and turbulent flow with respect

14:50:17 5 to an operating room?

14:50:18 6 A. As applied to an operating room, probably

14:50:20 7 not.

14:50:21 8 Q. Okay. Do you know whether or not you could

14:50:22 9 get true laminar flow in an operating room?

14:50:24 10 A. I would suspect that would be highly

14:50:27 11 unlikely.

14:50:32 12 Q. You don't hold yourself out as an expert in

14:50:36 13 particle flow in an operating room; correct?

14:50:37 14 A. Not that I've worked in. I've never

14:50:43 15 measured particle flows in an operating room, so I do

14:50:47 16 not consider myself to be an expert.

14:50:56 17 Q. Are you able to calculate how turbulent flow

14:51:00 18 affects particle movement in an operating room?

14:51:04 19 A. I -- I know how to do that in -- in general.

14:51:07 20 I would assume it would be applied to airflow in an

14:51:09 21 operating room also.

14:51:10 22 Q. Can you do that by hand, or do you need to

14:51:19 23 use the Navier-Stokes equation?

24 THE REPORTER: "...do you need to use" --

25 Q. Can you do that by hand, or do you need to

14:51:20 1 use some sort of computational modeling?

14:51:20 2 A. For realistic applications that are fairly

14:51:23 3 complex, you would need to use some software.

14:51:25 4 Q. Okay. Such as ANSYS?

14:51:27 5 A. Yes.

14:51:27 6 Q. Okay. And have you ever used ANSYS or any

14:51:34 7 type of computer program to determine how particles

14:51:44 8 move in a turbulent environment?

14:51:46 9 A. Yes.

14:51:47 10 Q. When?

14:51:47 11 A. I gave a short course for the American

14:51:50 12 Association of Aerosol Research probably 20 years ago

14:51:55 13 which included stochastic particle modeling, effect of

14:52:01 14 turbulence, turbulent kinetic energy, and basically

14:52:05 15 using Lagrange in particle tracking.

14:52:10 16 Q. And you agree with me that you have to use

14:52:18 17 Lagrange in particle tracking to actually track

14:52:21 18 particles in a turbulent environment; correct?

14:52:22 19 A. It turns out that if your particles are

14:52:24 20 small enough and the airflow does not change direction

14:52:27 21 very quickly, you could actually use a streamline, the

14:52:32 22 time-average streamlines, and predict the most

14:52:36 23 probable particle trajectory in a turbulent

14:52:40 24 environment.

14:52:40 25 Q. And when you say "small enough," usually one

14:52:43 1 micron or less; correct?

14:52:44 2 A. Yes.

14:52:44 3 Q. Anything larger than one micron actually has

14:52:47 4 inertia; correct?

14:52:49 5 A. As I said, it depends on the -- the

14:52:50 6 direction-of-flow change. If there's no significant

14:52:52 7 acceleration or direction-of-flow change, then you can

14:52:55 8 actually use larger particles.

14:52:55 9 Q. Well how large?

14:52:56 10 A. Again, depends on the -- the direction-of-

14:53:01 11 flow change.

14:53:01 12 Q. But you agree with me that even in a filter,

14:53:04 13 that particles larger than one micron do not follow

14:53:10 14 the -- the -- the airflow stream; correct?

14:53:11 15 A. Because of the -- the sharp transition of

14:53:13 16 air -- air streamlines around the fibers of the filter

14:53:17 17 material.

14:53:17 18 Q. And that's when you -- you -- you collect

14:53:20 19 particles by impaction during -- for larger particles;

14:53:22 20 correct?

14:53:22 21 A. That's correct.

14:53:22 22 Q. Because larger particles have inertia;

14:53:25 23 correct?

14:53:25 24 A. Yes.

14:53:25 25 Q. If there's a -- if there's a change in the

14:53:28 1 direction of the air stream, it's no longer going to
14:53:30 2 follow -- the particle is no longer going to follow
14:53:34 3 the air stream, it has inertia and will get away from
14:53:36 4 the air stream; correct?

14:53:38 5 A. And it depends on the ratio of the particle
14:53:42 6 inertia and the -- the acceleration.

14:53:42 7 Q. And in fact, when you add turbulence to the
14:53:50 8 equation, that also affects the airflow when the
14:53:56 9 intensity of the turbulence increases; correct? Or
14:54:00 10 particle movement.

14:54:00 11 A. Yes, it definitely affects particle
14:54:01 12 movement.

14:54:01 13 Q. Okay. You could have a general air stream,
14:54:04 14 but once you add turbulence to that air stream, you
14:54:08 15 really can't use the -- the mean average with respect
14:54:11 16 to particle movement any more because you have
14:54:13 17 turbulence.

14:54:13 18 A. That would still be the most probable
14:54:15 19 particle path. The turbulence dispersion would be
14:54:18 20 about that streamline.

14:54:24 21 Q. Okay. Do you have any articles to support
14:54:26 22 that opinion?

14:54:27 23 A. I'm -- I'm trying to think if -- if we
14:54:34 24 published something like that back in the early 1990s,
14:54:37 25 and I -- I'd have to go back and look at my

14:54:40 1 publication record.

14:54:41 2 Q. And there has been a lot of advancement in

14:54:44 3 computational fluid dynamics software since the 1990s;

14:54:47 4 hasn't there?

14:54:48 5 A. Yes.

14:54:48 6 Q. More-powerful computers; correct?

14:54:50 7 A. Yes.

14:54:51 8 Q. The technical limitation is actually the

14:54:54 9 computer.

14:54:54 10 A. That's probably correct.

14:54:56 11 Q. Might be other limitations, but the most

14:54:59 12 significant limitation in performing these

14:55:01 13 calculations are the ability of computers to actually

14:55:04 14 compute all the data.

14:55:06 15 A. It's -- it's the refinement of the grid

14:55:08 16 essentially.

14:55:16 17 Q. When is the last time you constructed a grid

14:55:20 18 for a CFD analysis?

14:55:23 19 A. Personally?

14:55:24 20 Q. Yes.

14:55:26 21 A. Probably -- it's been probably about 20

14:55:30 22 years ago.

14:55:37 23 Q. You've read Elghabashi's expert report;

14:55:43 24 correct?

14:55:43 25 A. I have.

14:55:43 1 Q. Do you agree that Elghabashi is an expert in
14:55:46 2 particle movement?

14:55:47 3 A. I would say he probably is, yes.

14:55:52 4 Q. Are you aware that --

14:56:04 5 You also looked at his deposition, correct,

14:56:08 6 Dr. Elghabashi's deposition?

14:56:08 7 A. I -- I was given his deposition. I did not
14:56:10 8 have a chance to read through it.

14:56:11 9 Q. Are you aware that he's doing work for the
14:56:13 10 military with aircraft-carrier design?

14:56:15 11 A. I was not aware of that.

14:56:17 12 Q. Okay. Are you aware that he has access to
14:56:20 13 the military supercomputer that most people don't have
14:56:23 14 access to?

14:56:23 15 A. I was not aware of that.

14:56:24 16 Q. Are you aware of the military supercomputer
14:56:27 17 that the military uses for aviation?

14:56:28 18 A. Not specifically, no.

14:56:31 19 Q. Are you familiar with the Navier-Stokes
14:57:06 20 equation?

14:57:07 21 (Discussion off the stenographic record.)

14:57:07 22 A. Yes.

14:57:09 23 Q. If I asked you to write the equation out,
14:57:12 24 could you do that today?

14:57:13 25 A. I could probably give it a good -- good

200

14:57:15 1 shot.

14:57:20 2 Q. So the answer to that would be maybe, but

14:57:22 3 not -- you're not a hundred percent sure you could do

14:57:25 4 it.

14:57:25 5 A. I -- I'm probably 90 percent sure I could do

14:57:27 6 it.

14:57:28 7 Q. Could you write out the boussinesq approach

14:57:36 8 with -- incorporating that into the Navier-Stokes

14:57:39 9 equation today?

14:57:42 10 A. I could probably do that.

14:57:47 11 Q. Have you reviewed the videos of Dr.

14:57:52 12 Elghabashi regarding his CFD analysis?

14:57:56 13 A. The videos, no.

14:57:59 14 Q. Did you ever consider doing your

14:58:12 15 measurements with a PIV?

14:58:14 16 A. Which -- which measurements?

14:58:16 17 Q. The measurements you did for Exhibit B with

14:58:18 18 a --

14:58:18 19 Do you know what a PIV is?

14:58:20 20 A. Yes.

14:58:21 21 Q. What's a PIV?

14:58:22 22 A. Particle Image Velocimetry.

14:58:27 23 Q. And that's the most accurate way to measure

14:58:28 24 velocity of the air today; correct?

14:58:28 25 A. It's a non-intrusive method. It's also a

201

14:58:34 1 very expensive piece of equipment and requires a lot
14:58:37 2 of data -- data analysis.

14:58:40 3 Q. Did you consider using that in your
14:58:40 4 analysis?

14:58:40 5 A. No, because of the --

14:58:44 6 I wasn't sure I had avail -- that type of
14:58:48 7 instrumentation available to me and how much effort it
14:58:52 8 would require to set it up and -- and reduce the data.

14:58:55 9 Q. And it's very expensive.

14:58:56 10 A. And it's very expensive, yes.

14:58:57 11 Q. Could be in -- in -- in the millions.

14:59:00 12 A. I don't think it's quite that much, but
14:59:02 13 certainly hundreds of thousands.

14:59:03 14 Q. Okay. Did you ever consider using ANSYS to
14:59:20 15 model the Bair Hugger in an operating room?

14:59:24 16 A. I did not really consider that. I really
14:59:27 17 have not done CFD work myself for -- for many years.

14:59:31 18 Q. But you consider yourself an expert in CFD.

14:59:35 19 A. I -- I know the protocol, the limitations,
14:59:39 20 yes.

14:59:39 21 Q. What are the limitations?

14:59:41 22 A. Limitations are associated with time steps,
14:59:45 23 with grid resolution, with the turbulent model that
14:59:49 24 you use if you're using a turbulent model, surface
14:59:53 25 conditions, any thermal buoyancy involved. And of

202

14:59:58 1 course particle modeling adds another way of
15:00:00 2 complexity.

15:00:01 3 Q. Do you think you're capable sitting here
15:00:03 4 today to perform a CFD analysis, without anyone else's
15:00:06 5 help, on an operating room?

15:00:08 6 A. It would take me quite a while to go back
15:00:11 7 and review the manual and get up -- up to speed. I
15:00:14 8 could probably do it, but it would take me quite a
15:00:16 9 while.

15:00:18 10 Q. So you'll agree with me that with respect to
15:00:19 11 computational fluid dynamics in the present, you're
15:00:23 12 not an expert in it as of right now.

15:00:25 13 A. In terms of actually personally performing
15:00:27 14 the results, --

15:00:27 15 Q. Yes.

15:00:27 16 A. -- no.

15:00:29 17 Q. So you'll agree that you're not an expert at
15:00:32 18 this point in time in your career.

15:00:34 19 A. In terms of analyzing other people's
15:00:37 20 results, I think I am. In terms of generating my own
15:00:39 21 results, no.

15:00:43 22 Q. Do you know the difference between a RANS
15:00:58 23 model and an LES model? R-A-N-S and L-E-S.

15:01:04 24 A. It's been a long time since I've thought
15:01:06 25 about that, but it's Reynolds Averaging Navier-Stokes

15:01:10 1 versus Large Eddy Simulation.

15:01:11 2 Q. When you performed CFD analysis, did you

15:01:14 3 ever use LES?

15:01:17 4 A. I did not personally. It was the Reynolds

15:01:21 5 Averaging.

15:01:21 6 Q. Okay. And -- and the purpose of the

15:01:25 7 boussinesq and the RANS is to reduce the computational

15:01:29 8 time when you use computational fluid dynamics;

15:01:35 9 correct?

15:01:35 10 A. That's correct, using a simplified set of

15:01:38 11 equations.

15:01:38 12 Q. Okay. When was the first time you saw a

15:01:51 13 Bair Hugger?

15:01:51 14 A. Probably in the -- the office, maybe in

15:01:58 15 March or April.

15:02:00 16 Q. Okay. And which Bair Hugger model was it?

15:02:03 17 A. I believe it was the -- we may have looked

15:02:06 18 at both the 505 and the 750 or 755, or --

15:02:15 19 There was an earlier version and at least

15:02:16 20 one of the later versions.

15:02:17 21 Q. Okay. Going -- going back, and I might have

15:02:22 22 asked you this before, you haven't seen Abraham's

15:02:25 23 report; correct?

15:02:25 24 A. I have not, yes.

15:02:26 25 Q. Okay. So you haven't seen whether or not he

204

15:02:29 1 used R -- RANS or LES or the type of turbulent
15:02:32 2 modeling.

15:02:33 3 A. Having not seen his report, I have no idea.

15:02:36 4 Q. Would you agree that when you -- when you
15:02:37 5 model an operating room and you have people in it as
15:02:41 6 well as lights and the flow is not turbulent -- or the
15:02:43 7 flow is turbulent, that you should have some sort of
15:02:46 8 turbulent modeling in your CFD analysis?

15:02:49 9 A. It depends what your ultimate objective is.

15:02:53 10 Q. To follow particles.

15:02:56 11 A. As I said before, if the streamlines had not
15:03:00 12 changed direction very rapidly and the particles are
15:03:03 13 small enough, they would simply follow the time-
15:03:06 14 average streamline without using a turbulence model.

15:03:08 15 Q. Okay. When you say they're not -- they
15:03:11 16 don't change direction very rapidly, what would that
15:03:13 17 mean? What does that mean to you?

15:03:14 18 A. I -- I go back to impactor technology where
15:03:18 19 you're purposely trying to extract particles from the
15:03:22 20 airflow by changing the direction very rapidly, and so
15:03:26 21 it depends on the velocity of the particle and -- and
15:03:28 22 the -- well basically the velocity of the particle
15:03:32 23 heading towards the surface, so impaction technology.

15:03:38 24 Q. Are you saying the change of airflow like 90
15:03:41 25 degrees, or are you saying five degrees, three

205

15:03:43 1 degrees?

15:03:43 2 A. It -- it --

15:03:44 3 Really, it depends on the rate of change of

15:03:46 4 airflow, the -- the acceleration I would -- I should

15:03:50 5 say, perpendicular to the mean flow direction.

15:03:54 6 Q. And in analyzing --

15:03:56 7 And in determining whether or not to use a

15:03:58 8 turbulent model in the CFD, how do you determine

15:04:00 9 whether or not you should assume that the particles

15:04:04 10 travel along the air streams or not?

15:04:08 11 A. Again, depends on whether your flow is

15:04:10 12 essentially unidirectional or there's a lot of

15:04:12 13 accelerations associated with it, and -- and the

15:04:14 14 directional changes.

15:04:15 15 Q. Well you agree with me that when you have

15:04:18 16 obstructions such as the patient, surgeon, table,

15:04:27 17 lights, you're going to have significant changes in

15:04:30 18 the airflow direction when the air hits that; correct?

15:04:33 19 A. Yes.

15:04:33 20 Q. Okay. Knowing what an operating room is, do

15:04:39 21 you agree with me that you should have some sort of

15:04:40 22 turbulence modeling in an operating room if you're

15:04:44 23 going to have a -- a valid CFD analysis?

15:04:46 24 MR. GOSS: Objection.

15:04:47 25 A. I think that would be the most appropriate,

15:04:51 1 but I wouldn't necessarily start there.

15:04:53 2 Q. Well it would be the better approach.

15:04:55 3 A. Actually, I would start with the first

15:04:57 4 approach of a time-averaged laminar-flow approach and

15:05:01 5 then do analysis on that and then see what would need

15:05:04 6 to be changed to -- if you -- if one would -- if one

15:05:09 7 needs to go to a turbulent approach.

15:05:11 8 Q. Why would you use a laminar-flow approach

15:05:13 9 when you -- when we just discussed that most likely

15:05:15 10 the air in an operating room is not laminar?

15:05:18 11 A. It's -- it's a much easier, straightforward,

15:05:21 12 simpler code to run.

15:05:24 13 Q. But it's not accurate.

15:05:26 14 A. It's not as completely accurate as -- as a

15:05:29 15 fully turbulent model, that's correct, but it's a good

15:05:32 16 starting point.

15:05:46 17 Q. When you first saw a Bair Hugger, did you

15:05:55 18 take it apart?

15:05:57 19 A. The first time, no, I don't think I did.

15:05:59 20 Q. Well did you ever take apart the Bair Hugger

15:06:01 21 and look at the internal components?

15:06:03 22 A. The only thing I've taken apart is the --

15:06:05 23 the filter in the -- the bottom.

15:06:07 24 Q. Do you believe that the Bair Hugger is a

15:06:08 25 sterile device internally?

15:06:11 1 A. I -- I have no knowledge of that.

15:06:13 2 Q. Okay. So you, sitting here today, you have

15:06:16 3 no opinion on whether or not there's any -- whether or

15:06:18 4 not the Bair Hugger hose harbors contaminants or

15:06:22 5 bacteria.

15:06:22 6 A. I would say it probably does.

15:06:24 7 Q. Okay. Do you understand the plaintiffs'

15:06:36 8 claims in this case?

15:06:41 9 A. Not -- not without hearing them again very

15:06:43 10 explicitly.

15:06:47 11 Q. What's your understanding of the mechanism

15:06:49 12 of injury the plaintiffs claim in this case?

15:06:53 13 A. I think the plaintiffs are claiming that the

15:06:55 14 Bair Hugger increases surgical-site infections.

15:07:01 15 Q. In what way?

15:07:02 16 A. By providing --

15:07:08 17 Could be disturbing airflow near the

15:07:11 18 surgical site, it could be providing additional

15:07:15 19 particles into the surgical site.

15:07:17 20 Q. And how would those particles get to the

15:07:19 21 surgical site?

15:07:20 22 A. If they're airborne, they have to be

15:07:24 23 convected there.

15:07:25 24 Q. Excuse me?

15:07:26 25 A. If they're airborne, they'd have to be

208

15:07:28 1 convected there.

15:07:29 2 Q. By conduction?

15:07:31 3 A. By convection.

15:07:33 4 Q. And do you know what pathway the par -- the

15:07:37 5 plaintiffs allege that particles get to the surgical

15:07:40 6 site when the Bair Hugger is on?

15:07:42 7 A. Not specifically, no.

15:07:43 8 Q. Okay. Did you make any assumption in -- in

15:07:48 9 formulating your test or testing?

15:07:50 10 A. Assumptions of what the plaintiffs'

15:07:53 11 arguments are?

15:07:54 12 Q. Yes.

15:07:54 13 A. None other than -- than maintaining as -- as

15:08:01 14 clean a wound area as possible.

15:08:18 15 Q. You agree with me that the Bair Hugger

15:08:20 16 produces more watts of energy than any other device in

15:08:26 17 the operating room; correct?

15:08:27 18 MR. GOSS: Objection, lacks foundation.

15:08:28 19 A. I -- I'm not aware of what other equipment

15:08:32 20 would -- what -- what the heat loads of other

15:08:35 21 equipment in the operating room would be.

15:08:40 22 Q. On page 11 of your report you indicate, "As

15:09:08 23 the Bair Hugger uses the power to provide heat, it may

15:09:11 24 be the most energy intensive piece of equipment in the

15:09:14 25 OR."

209

15:09:14 1 A. That's what I said, yes.

15:09:16 2 Q. So you agree with me that --

15:09:19 3 Well do you mean "the most intensive energy

15:09:21 4 piece," like it absorbs the most en -- uses the most

15:09:24 5 energy?

15:09:24 6 A. Uses the most energy, yes.

15:09:26 7 Q. Okay. To create heat, which is energy;

15:09:30 8 correct?

15:09:30 9 A. Yes.

15:09:30 10 Q. Okay. Are you aware of any other device in

15:09:34 11 the OR that produces more watts of heat around the

15:09:41 12 patient than the Bair Hugger?

15:09:44 13 A. No, I'm not aware of that.

15:09:51 14 Q. When the Bair Hugger exits the blanket, did

15:09:57 15 you determine where most of the heat goes?

15:10:02 16 A. When the Bair Hugger exits the blanket?

15:10:04 17 Q. When the heat -- I'm sorry. When the heat

15:10:07 18 of the --

15:10:07 19 When the Bair Hugger blows and heat exits

15:10:10 20 the blanket, you know, the Bair Hugger blanket --

15:10:13 21 A. Yes.

15:10:13 22 Q. Okay. By the way, do you know what type of

15:10:15 23 blanket you used in your testing?

15:10:17 24 A. It was an over -- over-body blanket.

15:10:19 25 Q. Was it the 522?

210

15:10:21 1 A. I don't remember the exact number.

15:10:23 2 Q. Okay. Did you inspect the blanket or study

15:10:26 3 the blanket in any way?

15:10:27 4 A. It was installed before I arrived. I looked

15:10:31 5 at the entire installation.

15:10:32 6 Q. Who installed it?

15:10:34 7 A. Two nurses.

15:10:35 8 Q. What nurses?

15:10:36 9 A. I was told nurses from 3M.

15:10:39 10 Q. 3M has in-house nurses?

15:10:42 11 A. That was what I was led -- led to believe.

15:10:46 12 Q. So sitting here today, you don't know how

15:10:47 13 the setup was -- what was under the drapes?

15:10:52 14 A. I didn't remove the -- the drape to look

15:10:56 15 underneath, no.

15:10:58 16 Q. Have you seen the -- have you seen the Bair

15:11:04 17 Hugger upperbody blanket by itself?

15:11:06 18 A. Yes.

15:11:07 19 Q. And did you look at how many perforations

15:11:10 20 occur or how many are on the blanket?

15:11:13 21 A. A lot of them.

15:11:13 22 Q. How many?

15:11:14 23 A. I -- I couldn't hazard --

15:11:16 24 I don't want to hazard a guess. It's a lot

15:11:18 25 of holes.

211

15:11:18 1 Q. Over 10?

15:11:19 2 A. Oh, yes.

15:11:20 3 Q. Over a hundred?

15:11:21 4 A. Probably.

15:11:21 5 Q. Over a thousand?

15:11:22 6 A. Maybe.

15:11:23 7 Q. Okay. When the Bair Hugger --

15:11:26 8 Do you know what position the patient was in

15:11:27 9 when you did your testing?

15:11:29 10 A. It was set up to be a -- a hip surgery.

15:11:33 11 Q. Okay. So the patient was to the side.

15:11:35 12 A. Yes.

15:11:35 13 Q. Okay. And how was the Bair Hugger blanket

15:11:38 14 on the patient?

15:11:38 15 A. It was wrapped around his upper body so his

15:11:45 16 head was protruding at -- at one end, and a blanket

15:11:47 17 over the whole thing, and then there was an anesthesia

15:11:51 18 drape over that.

15:11:52 19 Q. Okay. And how far did the drape go down?

15:11:55 20 A. The photographs in my report would -- would

15:11:57 21 show that.

15:11:57 22 Q. Are all the photographs taken are in your

15:11:59 23 report?

15:12:00 24 A. I believe so, yeah.

15:12:01 25 Q. So there are no other photographs that you

212

15:12:02 1 took.

15:12:03 2 A. No.

15:12:03 3 Q. Okay. Who took the photographs, you or Mr.

15:12:05 4 Goss?

15:12:06 5 A. It was either Peter or Vinita.

15:12:08 6 Q. Is that Vinita right there?

15:12:10 7 A. Yes.

15:12:11 8 Q. Okay. So you go to 3M, okay, to do this

15:12:30 9 testing, and when you get there it's already set up;

15:12:34 10 correct?

15:12:34 11 A. That's correct.

15:12:34 12 Q. Okay. And where in 3M was this testing,

15:12:42 13 what room?

15:12:43 14 A. It was in a lab room. I don't remember the

15:12:45 15 exact room number or building number.

15:12:47 16 Q. Was it a simulated operating room?

15:12:49 17 A. No, it was not an operating room.

15:12:51 18 Q. Okay. How big was the room?

15:12:52 19 A. It was roughly maybe 12 feet wide by maybe

15:12:59 20 15 feet deep with maybe a nine-foot ceiling.

15:13:04 21 Q. Okay. And how many doors to this room?

15:13:12 22 A. Just one.

15:13:13 23 Q. Okay. And so you get there and it's already

15:13:16 24 set up; correct?

15:13:17 25 A. Yes.

15:13:17 1 Q. So you don't -- you don't know in what
15:13:20 2 position the -- the blanket is in, the -- the Bair
15:13:22 3 Hugger blanket; correct?
15:13:23 4 A. Other than looking at the edges that are
15:13:26 5 sticking out from the blanket above.
15:13:27 6 Q. Okay. Was it laid all the way across the
15:13:30 7 patient?
15:13:30 8 The patient wasn't like in the crucifix
15:13:33 9 position; was he?
15:13:34 10 A. No. No.
15:13:35 11 Q. Okay.
15:13:35 12 A. Laying --
15:13:36 13 Q. Patient was to the side; correct?
15:13:38 14 A. Yeah. Yeah.
15:13:39 15 Q. Was the blanket -- was the blanket wrapped
15:13:41 16 around like in a -- in a -- circular over the patient,
15:13:43 17 was it only over -- was only half the blanket over the
15:13:47 18 patient, do you know?
15:13:47 19 A. It was over the entire upper body of the
15:13:50 20 mannequin and then it draped down somewhat on both
15:13:55 21 sides.
15:13:55 22 Q. Well if the patient's to the side like this,
15:13:57 23 was there part of the blanket that didn't cover the
15:13:59 24 patient, if you know?
15:14:01 25 A. I'd have to go back to the photos to look.

15:14:04 1 Q. Feel free.

15:14:05 2 A. Okay. I guess the first and last photos

15:14:50 3 show the majority of the blanket setup.

15:14:56 4 Q. I don't see the Bair Hugger in any of these

15:14:58 5 blankets. Can you tell me how you can look at

15:15:00 6 photos -- the first page and the last page of

15:15:03 7 pictures --

15:15:04 8 Well, the last page is a picture of the Bair

15:15:07 9 Hugger on a -- on a -- on a stand. Are you talking

15:15:11 10 about the second-to-last picture?

15:15:13 11 A. I think it was second-to-the-last, yes.

15:15:14 12 Q. Okay. So it's clear from the -- the picture

15:15:17 13 that is entitled "3 Inches Over Hip," you can't see

15:15:20 14 the Bair Hugger blanket in this picture; correct?

15:15:22 15 A. Probably not.

15:15:26 16 Q. Well "yes" or "no?"

15:15:27 17 A. I -- I -- I cannot see it, no.

15:15:29 18 Q. Okay. So you can't see the blanket in this

15:15:32 19 picture; correct?

15:15:33 20 A. Except perhaps maybe over my hand. That may

15:15:35 21 be part of the blanket coming down on one side.

15:15:38 22 Q. You think the Bair Hugger blanket is coming

15:15:40 23 over your hand?

15:15:41 24 A. Behind, behind my hand. If you look at the

15:15:44 25 top of my hand and -- and what's behind my hand, that

215

15:15:48 1 appears to be part of the blanket coming down on one
15:15:50 2 side.

15:15:52 3 Q. Can you circle that for me on that report
15:15:53 4 where you see the Bair Hugger blanket.

15:15:55 5 MR. GOSS: I think you're looking at
15:15:56 6 different pictures.

15:15:57 7 MR. ASSAAD: I'm looking at the one that
15:15:59 8 says "3 Inches Over Hip."

15:16:01 9 MR. GOSS: Yeah.

15:16:02 10 THE WITNESS: Yeah. And I'm --

15:16:03 11 MR. GOSS: So he --

15:16:04 12 MR. ASSAAD: Wait, wait, wait. I don't want
15:16:06 13 any instruction here. I don't want any coaching.

15:16:09 14 A. I'm referring to this.

15:16:10 15 Q. Okay. I'm talking about the one that says
15:16:12 16 "3 Inches Over Hip," the second-to-last picture of
15:16:15 17 Exhibit B. That picture right there. You just passed
15:16:20 18 it. See where it says "3 Inches Over Hip?"

15:16:22 19 A. Yeah.

15:16:22 20 Q. Do you agree that you can't see the Bair
15:16:24 21 Hugger blanket in this picture?

15:16:25 22 A. I agree with that.

15:16:26 23 Q. Okay. Wanted to make sure.

15:16:28 24 So you're looking at the first page where it
15:16:31 25 says "3 inches from blanket edge."

216

15:16:32 1 A. Yes.

15:16:33 2 Q. Okay. And where do you see the Bair Hugger

15:16:35 3 blanket?

15:16:35 4 A. Just to the --

15:16:38 5 I'll circle it here.

15:16:39 6 Q. Circle it, please.

15:16:41 7 A. (Complying.) Okay.

15:16:50 8 Q. Can I see Exhibit 1, please?

9 (Exhibit 1 handed to Mr. Assaad.)

15:16:54 10 Q. Okay. Fair enough. And I -- I see what

15:16:58 11 you're -- you're pointing to.

15:16:59 12 Now you can't see how this blanket is set up

15:17:03 13 underneath, what part of the body it's covering;

15:17:05 14 correct?

15:17:05 15 A. Not except for where it's extending out

15:17:08 16 under the blanket.

15:17:09 17 Q. Do you know whether or not the Bair Hugger

15:17:12 18 blanket was taped down to the patient?

15:17:14 19 A. I assume it was.

15:17:15 20 Q. I'm not asking you to assume anything. I

15:17:17 21 don't want any guesses.

15:17:18 22 Sitting here today, do you know whether or

15:17:20 23 not it was taped down or not?

15:17:21 24 A. I did not investigate that, no.

15:17:22 25 Q. Okay. I mean this is your experiment;

217

15:17:25 1 correct?
15:17:25 2 A. Yes.
15:17:26 3 Q. You're the doc --
15:17:27 4 You're the engineer; correct?
15:17:29 5 A. Right.
15:17:29 6 Q. You're in charge. You got to make sure that
15:17:30 7 everything is done properly because you're relying on
15:17:32 8 the setup to conduct your testing; correct?
15:17:35 9 A. That's correct.
15:17:35 10 Q. You did not check to see whether or not the
15:17:37 11 Bair Hugger blanket was taped; did you?
15:17:39 12 A. I did not.
15:17:39 13 Q. Okay. So sitting here, focused, you cannot
15:17:49 14 tell me whether or not air is escaping downward of the
15:17:52 15 body as compared to coming out of, like, the head or
15:17:55 16 the arms; correct?
15:17:57 17 MR. GOSS: Object to form.
15:17:58 18 A. Not having checked the taping, that -- I
15:18:02 19 cannot guarantee that.
15:18:04 20 Q. Do you know whether or not the taping
15:18:06 21 actually sticks well to a mannequin?
15:18:08 22 A. I -- I do not know that.
15:18:10 23 Q. That would be something important to know;
15:18:12 24 wouldn't it?
15:18:12 25 A. It would be useful, yes.

15:18:14 1 Q. Yeah. Because you might actually have
15:18:16 2 leakage of air going where it doesn't happily --
15:18:19 3 doesn't normally go during normal operation; correct?
15:18:22 4 MR. GOSS: Objection, form.
15:18:25 5 A. It's possible.
15:18:25 6 Q. And it could affect your results; correct?
15:18:29 7 MR. GOSS: Same objection.
15:18:30 8 A. Potentially.
15:18:30 9 Q. Did you talk to these nurses at all that set
15:18:32 10 up the operating room?
15:18:35 11 A. I did not.
15:18:35 12 Q. Okay. So sitting here today, you don't even
15:18:36 13 know their names; do you?
15:18:37 14 A. I do not know their names.
15:18:39 15 Q. Did you write their names down anywhere on
15:18:41 16 your -- on your pad?
15:18:42 17 A. No, because I do not know their names.
15:18:45 18 Q. You relied on 3M to do the setup; correct?
15:18:46 19 A. Yes.
15:18:46 20 Q. Okay. The same -- the same attorneys that
15:18:48 21 provided you the plethora of information that's out
15:18:51 22 there; correct?
15:18:52 23 MR. GOSS: Objection, argumentative, asked
15:18:54 24 and answered.
15:19:02 25 Q. And I assume you never measured the

219

15:19:04 1 temperature of the air coming out of the -- out of the
15:19:07 2 holes, correct, the perforations?

15:19:09 3 A. That's correct, I did not do that.

15:19:10 4 Q. Okay. Would you agree with me that the air
15:19:19 5 coming out of the perforations is roughly 40 to 41
15:19:22 6 degrees Celsius?

15:19:23 7 A. That sounds much higher than what I was
15:19:27 8 measuring right near the discharge of the air coming
15:19:29 9 out the edge of the blanket.

15:19:30 10 Q. Well let's talk about heat transfer for a
15:19:33 11 second.

15:19:37 12 By the way, what's the first law of
15:19:42 13 thermodynamics?

15:19:42 14 A. First law of thermodynamics is conservation
15:19:43 15 of energy.

15:19:44 16 Q. Energy is neither created or destroyed;
15:19:47 17 correct?

15:19:47 18 A. Yes.

15:19:48 19 Q. Heat transfer is a transfer of heat from a
15:19:53 20 higher heat content to a lower heat content; correct?

15:19:56 21 A. Higher temperature to a lower temperature.

15:19:58 22 Q. Yes. You're not going to transfer heat from
15:20:00 23 a -- you know, from a lower temperature to a higher
15:20:03 24 temperature. Heat transfer goes from highest to
15:20:05 25 lowest; correct?

220

15:20:06 1 A. Yes.

15:20:06 2 Q. That -- that's a fundamental engineering

15:20:09 3 principle; correct?

15:20:10 4 A. Yes.

15:20:10 5 Q. Okay. What's the temperature of a human

15:20:12 6 body?

15:20:13 7 A. Skin temp --

15:20:16 8 Well core temperature and then there's skin

15:20:18 9 temperature.

15:20:19 10 Q. Just skin temperature.

15:20:20 11 A. Skin temperature really depends on clothing

15:20:24 12 and the environment.

15:20:25 13 Q. Well what's the core temperature?

15:20:28 14 A. Core temperature is averaged around 98.6

15:20:31 15 Fahrenheit.

15:20:32 16 Q. Which would be what in Celsius? Thirty-six

15:20:36 17 and a half?

15:20:36 18 A. That sounds reasonable, yes.

15:20:38 19 Q. Okay. So you agree with me that to warm a

15:20:43 20 patient, the temperature has to be above 36.5 degrees

15:20:46 21 Celsius.

15:20:46 22 A. Not necessarily, because the skin

15:20:49 23 temperature could be much lower than that.

15:20:52 24 Q. Well what do you think the skin temperature

15:20:55 25 is?

15:20:56 1 A. As I said, it depends on -- on clothing
15:20:58 2 and -- and the ambient environment.
15:21:00 3 Q. So if 3M has done research and done studies
15:21:05 4 and indicated the temperature coming out of the Bair
15:21:07 5 Hugger blanket is between 40 to 41 degrees Celsius
15:21:10 6 when a Bair Hugger 775 is used on a 522 blanket, would
15:21:14 7 you disagree with that?
15:21:16 8 A. Say that again.
15:21:19 9 Q. Would you dis -- would you disagree with
15:21:21 10 3M's own studies that indicates that the temperature
15:21:24 11 coming out of a Bair Hugger blanket from the
15:21:27 12 perforations when a 775 blower is used and a 522
15:21:34 13 blanket is used is between 40 to 41 Celsius, would you
15:21:38 14 disagree with that?
15:21:40 15 A. If that's their measurements, I would not
15:21:42 16 disagree with that.
15:21:43 17 Q. Do your measurements reflect that?
15:21:45 18 A. My measurements were taken at a different
15:21:47 19 location.
15:21:47 20 Q. Okay. So sitting here today, you have no
15:21:51 21 idea what the temperature out of the blanket -- the
15:21:58 22 air temperature out of the blanket is.
15:22:00 23 MR. GOSS: Objection to form.
15:22:01 24 A. I -- I do in the locations that I measured.
15:22:04 25 Q. I'm talking about right directly out of the

15:22:06 1 blanket. You don't know what that is; do you?

15:22:07 2 A. There was a discharge right out of the

15:22:11 3 blanket right near the first figure where I'm

15:22:13 4 measuring the temperature and velocity.

15:22:17 5 Q. That's three inches from the blanket edge;

15:22:20 6 correct?

15:22:21 7 A. Yes, I think that's right.

15:22:23 8 Q. Okay. And you measured it at, when the Bair

15:22:26 9 Hugger was off, at 66.2 degrees; correct?

15:22:29 10 A. Yes.

15:22:29 11 Q. Okay. Now let's talk about this room some

15:22:31 12 more. Okay? Did the room have ventilation?

15:22:37 13 A. Yes.

15:22:38 14 Q. What was the ventilation?

15:22:40 15 A. It was provided through a ceiling supply and

15:22:43 16 ceiling return.

15:22:44 17 Q. Okay. One ceiling supply, one ceiling

15:22:47 18 return?

15:22:47 19 A. It was a -- a slot supply at one end of the

15:22:50 20 room and a slot return at the other.

15:22:52 21 Q. Okay. Was it positive pressure or negative

15:22:54 22 pressure or neutral pressure?

15:22:56 23 A. I did not measure that.

15:22:58 24 Q. Well wouldn't that be something important to

15:22:59 25 know?

223

15:22:59 1 A. Not necessarily, because if -- if -- unless
15:23:02 2 there was significant leakage between the room and the
15:23:05 3 surrounding areas.

15:23:06 4 Q. Well can we assume that there was no
15:23:07 5 leakage?

15:23:07 6 A. That would be a good assumption.

15:23:08 7 Q. Okay. What was the temperature of the
15:23:10 8 walls?

15:23:10 9 A. Temperature of the walls were probably near
15:23:14 10 the initial temperature when we started the test,
15:23:16 11 so --

15:23:17 12 Q. Sixty-six degrees?

15:23:18 13 A. -- probably about 66.

15:23:19 14 Q. Okay. What was the temperature of the --
15:23:24 15 was --

15:23:24 16 Was it an operating room table that was
15:23:24 17 used?

15:23:25 18 A. I believe so, yes.

15:23:26 19 Q. They actually had a real operating table in
15:23:29 20 this random room at 3M.

15:23:30 21 MR. GOSS: Objection to form.

15:23:31 22 A. Well what -- what do you mean by "real
15:23:34 23 operating table?"

15:23:35 24 Q. Did you see the table, or was it covered
15:23:37 25 with drapes?

15:23:39 1 A. It was covered with drapes.

15:23:39 2 Q. So you don't know what was underneath; do

15:23:41 3 you?

15:23:41 4 MR. GOSS: Objection to form.

15:23:41 5 A. Not --not really.

15:23:45 6 MR. ASSAAD: Basis.

15:23:46 7 MR. GOSS: Well, it was set up by nurses, so

15:23:49 8 he's assuming that they set it up in a way they would

15:23:52 9 have done for a real operation. That's my basis.

15:23:58 10 MR. ASSAAD: Do you have a legal -- do you

15:24:00 11 have a legal basis?

15:24:01 12 MR. GOSS: You're -- you are -- you are

15:24:04 13 expressing the idea that he knew absolutely nothing.

15:24:06 14 He's not a nurse. He relied on the nurses to set

15:24:10 15 everything up and use the proper equipment.

16 Q. So you relied on --

15:24:14 17 MR. GOSS: That's my basis.

15:24:14 18 Q. You relied on nurses; correct?

15:24:16 19 A. Yes.

15:24:16 20 Q. Nurses you don't know; correct?

15:24:18 21 A. Yes.

15:24:18 22 Q. Nurses hired by 3M; correct?

15:24:20 23 A. Probably, yes.

15:24:21 24 Q. They were 3M nurses; correct?

15:24:23 25 A. I do not know who they were.

225

15:24:24 1 Q. I mean does 3M have a hospital inside its
15:24:27 2 facility?

15:24:27 3 A. Not that I'm aware of.

15:24:28 4 Q. Okay. Do you know if any of the attorneys
15:24:33 5 were involved in the setup?

15:24:34 6 (Discussion off the stenographic record.)

15:24:34 7 A. I don't think so. I think we met there
15:24:37 8 together.

15:24:38 9 Q. How did you get into the building? Did you
15:24:40 10 meet Mr. Goss and his associate at -- at the front of
15:24:43 11 the building?

15:24:43 12 A. Yes.

15:24:44 13 Q. Okay. Do you know whether or not Mr. Goss
15:24:48 14 or his associate was involved in the setup?

15:24:50 15 A. I do not know that.

15:24:59 16 Q. You agree that people emit energy that -- or
15:25:39 17 heat in a -- in a room; correct? The heating load.

15:25:42 18 A. People give off energy, yes.

15:25:44 19 Q. Okay.

15:25:45 20 A. Yeah.

15:25:45 21 Q. That's why people --

15:25:46 22 If the room is really crowded, if you get
15:25:49 23 really warm, you have to turn up the air conditioning;

15:25:53 24 correct?

15:25:53 25 A. Yes.

15:25:54 1 Q. To increase the cooling load; correct?

15:25:57 2 A. Right.

15:25:57 3 Q. Okay. Do you agree that the setup that you

15:25:59 4 have here is not similar to what actually occurs in an

15:26:01 5 operating room?

15:26:02 6 A. I would agree that the room configuration is

15:26:05 7 not a typical operating room, yes.

15:26:07 8 Q. Well you don't have surgical lights;

15:26:09 9 correct?

15:26:09 10 A. Yes.

15:26:10 11 Q. You don't have surgeons and -- and an

15:26:15 12 anesthesiologist around the surgical table; correct?

15:26:17 13 A. Right.

15:26:17 14 Q. And you agree that's going to affect airflow

15:26:20 15 as well as turbulence as well as heat transfer;

15:26:23 16 correct?

15:26:23 17 A. Yes.

15:26:24 18 Q. Okay. Now did the room have its own

15:26:37 19 thermostat?

15:26:39 20 A. I believe it did.

15:26:40 21 Q. Well "yes" or "no."

15:26:42 22 A. Yes.

15:26:43 23 Q. Okay. Did you change the thermostat at all

15:26:45 24 during the -- during the testing?

15:26:47 25 A. Yes.

15:26:48 1 Q. You did?

15:26:49 2 A. Yes.

15:26:49 3 Q. What did you change it from?

15:26:50 4 A. Increased it, I don't remember the exact

15:26:58 5 number, from -- it may have been set something like

15:27:02 6 65, maybe up to 70, something like that.

15:27:04 7 Q. Why did you change it?

15:27:05 8 A. Just seemed to be extremely cold in there.

15:27:09 9 Q. Did you change it in the middle of the test

15:27:11 10 or before the testing?

15:27:12 11 A. Before the testing.

15:27:13 12 Q. Okay. How much longer before the testing?

15:27:17 13 A. Maybe a half hour.

15:27:19 14 Q. Half hour. Okay.

15:27:20 15 So by the 30 minutes, the room should have

15:27:23 16 been at equilibrium; correct?

15:27:24 17 A. That's a good assumption.

15:27:25 18 Q. Okay. So if you changed it to 70, okay, why

15:27:28 19 am I seeing results of 66.6 degrees here?

15:27:31 20 A. It -- it may have just taken -- taken longer

15:27:39 21 than I --

15:27:42 22 Q. You just told me it was at equilibrium.

15:27:44 23 A. Well may -- maybe it did not reach

15:27:45 24 equilibrium yet.

15:27:46 25 Q. We don't know. We could --

15:27:48 1 So now we don't know if these numbers are
15:27:51 2 correct; do we?

15:27:52 3 MR. GOSS: Objection to form.

15:27:53 4 A. The numbers are -- are correct as I measured
15:27:54 5 them in the location I measured them.

15:27:54 6 Q. Well now add another variable. You added --
15:27:56 7 you changed the room temperature.

15:27:57 8 A. Yes.

15:27:57 9 Q. You then -- now --

15:27:59 10 You said it was at equilibrium and now
15:28:00 11 you're saying it might not be at equilibrium. Which
15:28:02 12 one it is, doctor?

15:28:03 13 MR. GOSS: Wait for a question.

15:28:04 14 Q. Which one is it?

15:28:06 15 A. May not be in equilibrium.

15:28:07 16 Q. Okay. So now you have a variable that
15:28:09 17 you're not accounting for in your results; isn't that
15:28:12 18 correct?

15:28:12 19 A. Yes.

15:28:13 20 Q. And you call that good engineering?

15:28:16 21 MR. GOSS: Objection to form, argumentative.

15:28:20 22 A. If I had more time to develop a better test
15:28:23 23 method, I would probably take that into consideration.

15:28:26 24 Q. Well are you saying this is not a good test
15:28:28 25 method?

229

15:28:28 1 A. It -- it was set up to do some temperature
15:28:37 2 and flow measurements leaving the Bair Hugger blanket,
15:28:41 3 primarily, and entering the Bair Hugger filter.

15:28:43 4 Q. That wasn't my question. Is this a good
15:28:45 5 test method, "yes" or "no?"

15:28:47 6 A. Yes.

15:28:47 7 Q. Okay. So you have an operating room that's
15:28:49 8 not at --

15:28:50 9 You have a room that's not at equilibrium;
15:28:51 10 correct?

15:28:51 11 A. Yes.

15:28:53 12 Q. You don't know how the Bair Hugger is set up
15:28:56 13 underneath the blanket; correct?

15:28:57 14 A. Yes.

15:28:58 15 Q. Okay. You have --

15:29:00 16 You changed the temperature at some point
15:29:03 17 because you were cold; correct?

15:29:04 18 A. Yes.

15:29:05 19 MR. GOSS: Objection to form.

15:29:06 20 Q. Okay.

15:29:10 21 MR. ASSAAD: Basis.

15:29:11 22 MR. GOSS: He didn't say because he was
15:29:12 23 cold.

15:29:14 24 Q. Why did you change the temperature then?

15:29:17 25 A. I'm not sure I actually feel like I did

230

15:29:20 1 change the temperature.

15:29:21 2 Q. Who did?

15:29:23 3 A. May have been one of -- Peter or -- or

15:29:27 4 Vinita.

15:29:28 5 Q. I mean we have the law of thermodynamics.

15:29:31 6 We're not going to break that law; correct?

15:29:32 7 A. Right.

15:29:35 8 Q. Okay. You have the temperature coming out

15:29:35 9 at 70 degrees; correct? Seventy-two degrees.

15:29:40 10 A. Seventy-two degrees from what?

15:29:41 11 Q. It's coming out the diffuser.

15:29:44 12 A. It -- it may take a while for the thermostat

15:29:46 13 to --

15:29:51 14 Well, it may take a while for the air to

15:29:53 15 reach the temperature that the thermostat is set at.

15:29:55 16 Q. But you have the diffuser air coming out at

15:29:57 17 72 degrees and you did that 30 -- 30 minutes before

15:30:00 18 you started taking these tests; correct?

15:30:02 19 A. That's what I recall.

15:30:02 20 Q. Okay. And the room is only 12 by nine;

21 correct?

15:30:08 22 MR. GOSS: Objection.

15:30:08 23 A. Roughly 12 by 15 but with a nine-foot

15:30:10 24 ceiling.

15:30:11 25 Q. Nine feet high.

15:30:14 1 What's that volume?

15:30:15 2 A. I'd -- I'd have to calculate it.

15:30:17 3 Q. Are you sure about those numbers?

15:30:19 4 A. I'm not absolutely certain.

15:30:21 5 Q. Wouldn't that be important to know?

15:30:23 6 A. If I was looking at air-change rate, yes.

15:30:31 7 Q. So you're looking at about 10,000 cubic

15:30:34 8 feet. Does that sound about right?

15:30:36 9 A. That's probably about right.

15:30:37 10 Q. Eleven thousand.

15:30:39 11 Do you stand by these numbers, doctor, in

15:31:20 12 Exhibit B? Are they accurate? Are they reliable?

15:31:25 13 A. Based on the test configuration we had or

15:31:29 14 the conditions, yes.

15:31:30 15 Q. Well doctor, let's go to page -- the one

15:31:36 16 that says "3 Inches Over Hip."

15:31:41 17 Well before we get to that, let's go to the

15:31:43 18 last page of Exhibit B. That's the calibration by TSI

15:31:54 19 of the device; correct?

15:31:56 20 A. The very last page, yes.

15:31:57 21 Q. Okay. And on May 8th, 2017, this device was

15:32:00 22 calibrated; correct?

15:32:01 23 A. That's what it says, yes.

15:32:02 24 Q. Okay. And you -- you -- you agree with

15:32:06 25 this, that the device used was calibrated; correct?

232

15:32:08 1 A. Yes.

15:32:08 2 Q. Who provided the device?

15:32:10 3 A. Device was provided by 3M.

15:32:12 4 Q. Okay. So 3M provided the device and 3M

15:32:15 5 provided the room and 3M provided the setup; correct?

15:32:19 6 A. Well that's my understanding.

15:32:20 7 Q. Okay. Whose idea was it to do this testing?

15:32:23 8 A. I think it was mine.

15:32:24 9 Q. Okay. Why didn't you do it at the

15:32:25 10 University of Minnesota?

15:32:26 11 A. I am no longer a faculty member there, I'm

15:32:30 12 retired, so I did not have access to a facility.

15:32:31 13 Q. Okay. Let's go to the page that says "3

15:32:34 14 Inches Over Hip" where it was "Under linear slot

15:32:42 15 diffuser air supply on ceiling (Front) - half inch

15:32:45 16 from supply." Do you see that?

15:32:47 17 A. Wait a minute.

15:32:49 18 Q. It's the pic -- it's -- it's the picture --

15:32:51 19 A. Oh.

15:32:53 20 Q. You measured the temperature coming out of

15:32:55 21 the air supply; correct?

15:32:58 22 A. Yes.

15:32:59 23 Q. And this was done 30 minutes --

15:33:00 24 You changed the temperature 30 minutes

15:33:02 25 before you started doing any testing; correct?

233

15:33:04 1 A. That -- that's my recollection.

15:33:06 2 Q. I mean that's an important fact when you're

15:33:09 3 going to start taking temperature measurements, that

15:33:10 4 you actually changed the temperature of the air

15:33:13 5 supply; don't you agree?

15:33:15 6 A. Yes, it would be important to document that.

15:33:17 7 Q. Very important. Is it documented anywhere

15:33:19 8 in your report?

15:33:20 9 A. No.

15:33:20 10 Q. Okay. So we see, depending on where you're

15:33:27 11 measuring, you see anywhere between 330 feet per

15:33:30 12 minute to 1550 feet per minute; correct?

15:33:34 13 A. That's correct.

15:33:34 14 Q. Are those numbers accurate?

15:33:35 15 A. I believe they -- I believe they're

15:33:37 16 accurate.

15:33:37 17 Q. Okay. So you tried --

15:33:38 18 In the same diffuser, you're getting a range

15:33:41 19 of 330 to 1550 feet out of the same duct.

15:33:46 20 A. There are actually three separate diffusers

15:33:47 21 end to end.

15:33:48 22 Q. Okay. So three diffusers. So I should add

15:33:51 23 all these up for the amount of air entering the room;

15:33:55 24 correct?

15:33:55 25 A. That's --

234

1 Q. Sounds good since that is --

15:33:55 2 A. That's not going to be volumetric flow rate.

15:33:58 3 MR. GOSS: Just let him finish, please. Let

4 him finish.

15:34:00 5 Q. Huh?

15:34:00 6 A. That's not volumetric flow rate. Those are

7 just velocity measurements in the center of the

8 diffuser.

15:34:04 9 Q. Okay. So that's the velocity of the air

15:34:04 10 coming in; correct?

15:34:04 11 A. Yes.

15:34:04 12 Q. Do you know what the flow rate is?

15:34:05 13 A. I did not calculate that.

15:34:06 14 Q. Would that be important to know?

15:34:08 15 A. Perhaps.

15:34:09 16 Q. Perhaps or yes?

15:34:10 17 A. Yes.

15:34:10 18 Q. That's a -- that's a pretty high velocity;

15:34:25 19 isn't it?

15:34:25 20 A. It is, yes.

15:34:26 21 Q. Okay. So in a room that small, you would

15:34:30 22 agree that within 30 minutes you should reach

15:34:33 23 equilibrium.

15:34:35 24 A. I'd have to look at the -- the wall

15:34:37 25 structure and the thermal mass in the room, and --

235

15:34:39 1 and I -- I can't -- I can't speculate at this point.

15:34:42 2 Q. Okay. But that would be important to know;

15:34:44 3 wouldn't it?

15:34:45 4 A. It -- it would.

15:34:45 5 Q. And sitting here today we don't know that;

15:34:47 6 do we?

15:34:48 7 A. We do not.

15:34:49 8 Q. Okay. But what we do know is this, okay,

15:34:52 9 that the air is coming in at 72 degrees, it's been on

15:34:55 10 for 30 minutes, and you're getting temperatures below

15:34:59 11 72 degrees in the -- in the room; correct?

15:35:01 12 A. Yes.

15:35:02 13 Q. Okay. And in fact, according to your

15:35:12 14 calculations, when the Bair Hugger is on, it actually

15:35:16 15 cools the area over the head; correct?

15:35:20 16 MR. GOSS: Objection to form.

15:35:21 17 A. I don't think I have temperature

15:35:24 18 measurements into the inlet of the Bair Hugger and out

15:35:28 19 at the same time, so --

15:35:29 20 Q. Well let's look at this page right here,

15:35:31 21 let's look at three inches over the hip. Bair Hugger

15:35:33 22 off, 70.7 degrees; correct?

15:35:35 23 A. Yes.

15:35:36 24 Q. That's parallel and perpendicular, that's

15:35:38 25 just giving you different flow rates; correct?

15:35:40 1 A. Yes.

15:35:41 2 Q. Okay. And then you turn the -- you turn --

15:35:45 3 you turn the Bair Hugger on and all of a sudden the

15:35:48 4 temperature is 64.9 degrees. Does that make sense?

15:35:52 5 A. That's what it says.

15:35:53 6 Q. Does that make engineering sense?

15:35:57 7 A. Unless there was something going on with

15:36:00 8 temperature fluctuations in the room, I -- I -- I

15:36:02 9 don't know.

15:36:02 10 Q. That does not make sense; does it, doctor?

15:36:07 11 A. Again, I don't know how the HVAC system

15:36:10 12 temperature was controlled.

15:36:13 13 Q. We're talking about a six- -- a five-degree

15:36:14 14 drop, almost six degrees once you turn the Bair Hugger

15:36:16 15 on.

15:36:19 16 Let me back up a second. Doctor, did you do

15:36:21 17 these tests in a continuous fashion or did you go take

15:36:27 18 measurements, then change the thermostat and take

15:36:31 19 measurements with the Bair Hugger on?

15:36:34 20 A. No. The thermostat was changed before we

15:36:34 21 did any of the measurements.

15:36:35 22 Q. Okay. And you took them in continuous

15:36:37 23 fashion. You turned the Bair Hugger --

15:36:39 24 It was off and then you turned it on to see

15:36:40 25 what the change was; correct?

15:36:42 1 A. Yes.

15:36:43 2 Q. How long did you wait?

15:36:44 3 A. It probably took, I would guess, maybe an

15:36:48 4 hour for the measurements with the Bair Hugger off

15:36:49 5 before we turned it on.

15:36:51 6 Q. So you spent an hour with the Bair Hugger

15:36:52 7 off and then you turned it on.

15:36:54 8 A. Yes.

15:36:55 9 Q. So you did all the measurements off first

15:36:56 10 and then all the measurements on later?

15:36:58 11 A. I'm -- I'm trying to recollect the -- the

15:37:06 12 sequence of -- of measurements.

15:37:08 13 Q. Well I mean part of writing a scientific

15:37:11 14 report is that someone else could reproduce the

15:37:15 15 results; correct?

15:37:15 16 A. Yes.

15:37:16 17 Q. Okay. None of that is in this report;

15:37:19 18 correct?

15:37:19 19 A. Without additional information, that's

15:37:22 20 correct.

15:37:22 21 Q. I'm asking you in this report is there

15:37:25 22 any --

15:37:25 23 Is there a methodology written out in this

15:37:27 24 report how this was done?

15:37:28 25 A. No, there's no methodology.

15:37:30 1 Q. There's no methodology in this report; is
2 there?
15:37:32 3 A. No.
15:37:33 4 MR. GOSS: Asked and answered.
15:37:38 5 Q. So how is it that when you have the first
15:37:43 6 law of thermodynamics and you turn on a device that
15:37:47 7 blows 40-degree heat into an operating room -- or into
15:37:50 8 a room that's only 12 by 15, that you see a reduction
15:37:57 9 in air temperature? Can you answer that question?
15:38:00 10 A. I'm -- I'm trying to recollect the actual
15:38:03 11 sequence of measurements.
15:38:05 12 Q. Forget about the sequence. I'm looking at
15:38:08 13 the data here. This is your data. You say one
15:38:10 14 minute, two minutes, three minutes, four minutes. How
15:38:14 15 is adding heat to a room, and you have the first law
15:38:18 16 of thermodynamics, Engineering 101, --
15:38:21 17 MR. GOSS: You don't have to yell.
15:38:22 18 Q. -- and you have to get a reduction in
15:38:24 19 temperature, could you please answer that question?
15:38:26 20 MR. GOSS: You don't -- you don't have to
15:38:27 21 yell at him.
15:38:31 22 A. I -- I would have to give that more thought
15:38:34 23 to explain why the --
15:38:35 24 Q. Now is your time for an answer. I'm not
15:38:38 25 coming back another day.

239

15:38:39 1 A. Okay.

15:38:39 2 Q. Do you know the answer to that? "Yes" or

15:38:42 3 "no."

15:38:42 4 A. Not at the moment without further thought.

15:38:44 5 Q. What further thought? Would it violate the

15:38:46 6 first law of thermodynamics?

15:38:47 7 A. I'd have to think about other aspects of the

15:38:51 8 airflow in the room that may have affected that.

15:38:54 9 Q. What other aspects are there? We have the

15:38:55 10 ventilation that we have accounted for. That's been

15:38:57 11 constant. Okay? What -- what other aspects?

15:39:00 12 A. I am not sure the ventilation rate was

15:39:02 13 constant.

15:39:03 14 Q. Well do you know one way or the other?

15:39:04 15 A. I do not know.

15:39:05 16 Q. Okay. Well if it wasn't constant, that's

15:39:09 17 going to affect all your results; correct?

15:39:11 18 A. I would not think it would affect the

15:39:13 19 results right near the Bair Hugger blanket or right

15:39:16 20 near the inlet to the filter.

15:39:20 21 Q. Well it's affecting the area right above the

15:39:21 22 hip.

15:39:21 23 A. That's not near the Bair Hugger blanket

15:39:24 24 discharge or the filter inlet.

15:39:26 25 Q. We're measuring above the hip here. We're

240

15:39:28 1 seeing a change for no apparent reason when the Bair
15:39:32 2 Hugger is on to a lower level.

15:39:36 3 A. Again --

15:39:36 4 Q. What -- what -- what's the second law of

15:39:39 5 thermodynamics?

15:39:42 6 A. Can't destroy entropy.

15:39:44 7 Q. Okay. What's entropy?

15:39:47 8 A. It's a natural direction of disorder.

15:39:53 9 Q. You go from order to disorder; correct?

15:39:54 10 A. Yes.

15:39:56 11 Q. Such as, in this case, as heat leaves an

15:39:58 12 area, it's going to dissipate in an orderly fashion;

15:40:03 13 correct?

15:40:03 14 A. That's correct.

15:40:03 15 Q. Okay. Entropy applies to this case;

15:40:08 16 correct?

15:40:08 17 A. That should apply to every case.

15:40:10 18 Q. And in a room of this confinement, 12 by

15:40:13 19 15 --

15:40:13 20 Which is not a large room; correct?

15:40:16 21 A. That's not very large, yes.

15:40:17 22 Q. Okay. So you have the first law of

15:40:19 23 thermodynamics and the second law of thermodynamics,

15:40:22 24 it's going to increase the average temperature in the

15:40:25 25 room if you turn on the Bair Hugger; correct?

15:40:27 1 A. Say that again.

15:40:30 2 Q. The Bair Hugger is going to increase the

15:40:32 3 temperature of the room. You have another heat source

15:40:34 4 of -- of -- of a device blowing 40-degree Celsius air

15:40:38 5 at 43 to 45 cfm. It's going to --

15:40:42 6 It's a heater, it's a space heater.

15:40:44 7 A. Yes, it's a heater.

15:40:46 8 Q. Okay. It's going to affect the temperature

15:40:48 9 of the room. It's not going to decrease the

15:40:49 10 temperature; correct?

15:40:50 11 A. Right.

15:40:52 12 Q. Okay. But we have a decrease here; correct?

15:40:53 13 A. That -- that's what it shows.

15:40:55 14 Q. Okay. You agree that these numbers are not

15:40:58 15 reliable.

15:40:58 16 MR. GOSS: Objection to form.

15:41:05 17 A. I would -- I would argue with not being

15:41:08 18 reliable. Those -- those are the measurements that we

15:41:10 19 made at the time.

15:41:12 20 Q. Part of your job as an engineer is to look

15:41:13 21 at the reliability of the data you obtain; correct?

15:41:16 22 A. Yes.

15:41:16 23 Q. Okay. As a scientist, you have to look at

15:41:19 24 its reliability; correct?

15:41:20 25 A. Yes.

242

15:41:20 1 Q. You have a project --

15:41:22 2 And this is where the hypothesis is very

15:41:24 3 important. Okay? Hypothesis: I have a Bair Hugger

15:41:27 4 in a room. I turn it on. It's going to increase the

15:41:30 5 temperature. That would be a correct hypothesis in

15:41:33 6 that situation; correct?

15:41:35 7 A. Yes.

15:41:35 8 Q. Okay. And all of a sudden you turn it on

15:41:36 9 and you get something against the hypothesis, it

15:41:39 10 decreases the temperature according to your data;

15:41:42 11 correct?

15:41:42 12 MR. GOSS: Objection to form.

15:41:42 13 A. That -- that's what it appears, yes.

15:41:45 14 Q. That's the measurements you took; correct?

15:41:47 15 A. Yes.

15:41:47 16 Q. Not only does this violate the first and

15:41:50 17 second laws of thermodynamics, it doesn't make sense;

15:41:53 18 correct?

15:41:57 19 A. Can I interject something here?

15:41:59 20 Q. "Yes" or "no," then you can do that.

15:42:01 21 MR. GOSS: You can -- you can answer his

15:42:03 22 question.

15:42:04 23 A. It -- in --

15:42:05 24 From a straight heat-transfer standpoint,

15:42:08 25 no, it does not make sense.

15:42:09 1 Q. Okay. Therefore it's not reliable.

15:42:10 2 MR. GOSS: Object to form.

15:42:11 3 A. I guess -- I guess one could come to that

15:42:16 4 conclusion.

15:42:16 5 Q. Well what do you come to? Do you believe

15:42:18 6 this data here is reliable with respect to the

15:42:20 7 measurements on Exhibit B of your Exhibit 1 of your

15:42:23 8 report, which is three inches over the hip, and when

15:42:28 9 the Bair Hugger is turned on the temperature above the

15:42:28 10 hip goes down? Does that make engineering sense?

15:42:31 11 A. It may not.

15:42:38 12 Q. You agree with me, doctor, that this is not

15:42:40 13 reliable data with this set of data points; correct?

15:42:44 14 MR. GOSS: Objection to form, asked and

15:42:45 15 answered.

15:42:46 16 MR. ASSAAD: He hasn't answered the

15:42:48 17 question.

15:42:48 18 MR. GOSS: Yeah, I think he has.

15:42:49 19 A. I'll -- I'll agree with you.

15:42:50 20 Q. It's not reliable; correct?

15:42:52 21 MR. GOSS: Objection to form.

15:42:53 22 A. It -- it's not reproducible probably.

15:42:55 23 Q. Or reliable; correct?

15:42:57 24 MR. GOSS: Objection to form.

15:42:58 25 A. Again, how do you define "reliable?"

244

15:43:03 1 Q. Show me an engineering calculation in which
15:43:06 2 you add a heat source to a room and the -- and the
15:43:09 3 temperature of the room -- that's the only change in
15:43:12 4 the room, you add a heat source, okay, above the
15:43:17 5 ambient temperature, that the temperature actually
15:43:17 6 goes below ambient. Can you give me a calculation and
15:43:20 7 engineering principles that could solve that equation?

15:43:25 8 A. It may have to do with the initial
15:43:27 9 temperature of the room being -- being low and the
15:43:31 10 heat being ab -- absorbed by those low-temperature
15:43:34 11 surfaces.

15:43:35 12 Q. You turn on the Bair Hugger and the
15:43:37 13 temperature started going down. The room was
15:43:40 14 constant. Okay? How does this result occur unless
15:43:45 15 these are wrong results and therefore not reliable?

15:43:47 16 MR. GOSS: Objection to form, misstates the
15:43:50 17 experiment.

15:43:50 18 MR. ASSAAD: I just want him to answer the
15:43:52 19 question.

15:43:54 20 Q. Do we need to go back to engineering ethics
15:43:57 21 about honesty, integrity, fidelity?

15:43:59 22 MR. GOSS: Badgering.

15:44:02 23 Q. It's a simple question, doctor. You know
15:44:05 24 these -- these are not reliable. Just admit to it.

15:44:07 25 MR. GOSS: No. Objection to form,

245

15:44:09 1 argumentative, badgering.

15:44:12 2 A. I -- I stand by the results as -- as

15:44:16 3 obtained.

15:44:16 4 Q. I don't care if you stand by them or not. I

15:44:18 5 want to know if these are reliable. Answer the

15:44:19 6 question.

15:44:20 7 MR. GOSS: He answered the question.

15:44:21 8 MR. ASSAAD: No, he hasn't.

15:44:22 9 MR. GOSS: You don't have to say anything

15:44:23 10 further on this. You answered the question.

15:44:23 11 Q. Then I'm going assume that it's not reliable

15:44:25 12 according to your testimony. Fair enough?

15:44:27 13 MR. GOSS: You can assume whatever you want.

15:44:30 14 He testified that he stands by the results.

15:44:32 15 Q. How are these temperatures higher or lower

15:44:34 16 than the air going into the air return?

15:44:50 17 A. I -- I can't answer that. I don't have a

15:45:03 18 good explanation for that.

15:45:09 19 Q. Go to the page before that. "Over center of

15:45:13 20 anesthesia screen, 3 inches above top (Center)." Now

15:45:21 21 the diffuser's on the ceiling; correct?

15:45:23 22 A. That's correct.

15:45:23 23 Q. And there's three of them; correct?

15:45:25 24 A. Yes.

15:45:25 25 Q. Okay. Are they all spread evenly in the

246

15:45:28 1 ceiling?

15:45:28 2 A. Yes, they're -- they're lined up.

15:45:30 3 Q. Okay. Did you take any pictures?

15:45:32 4 A. Not of those, no.

15:45:33 5 Q. Okay. That would be something important

15:45:35 6 to -- to have today; wouldn't it?

15:45:37 7 A. If this was set up as a simulated OR, yes,

15:45:41 8 but I admit it's not a typical OR setup.

15:45:44 9 Q. So you have air coming out at 72 degrees

15:45:46 10 except you read when the -- when the Bair Hugger is on

15:45:51 11 but on ambient it's 64.9 degrees. How do you get that

15:45:55 12 temperature?

15:45:59 13 Not only is it below the 66 degrees that you

15:46:02 14 think the room is at or you stated was in the report,

15:46:05 15 but it's below the 72.

15:46:09 16 A. That does strike me as unusual.

15:46:11 17 Q. Is that a reliable number?

15:46:13 18 A. I would say probably not.

15:46:15 19 Q. Okay. Did you determine where most of the

15:47:24 20 air --

15:47:26 21 I asked you this before; I don't think I had

15:47:27 22 an answer. Do you know where most of the air goes

15:47:29 23 when it comes out of the blanket, where it escapes

15:47:32 24 from?

15:47:32 25 A. I did not determine that.

15:47:33 1 Q. Would that be important to know where to
15:47:36 2 make measurements?

15:47:38 3 A. I was assuming that the blanket was -- was
15:47:40 4 taped as it should be on the lower-body end, and so
15:47:44 5 the air would be coming out near the head and shoulder
15:47:47 6 area.

15:47:47 7 Q. Why would you assume it comes out near the
15:47:50 8 head and shoulder?

15:47:50 9 A. Because of the blanket that's put over the
15:47:54 10 Bair Hugger blanket.

15:47:56 11 Q. Yeah. But it's also going over the arm;
15:47:58 12 correct?

15:47:58 13 A. Yes. Yes.

15:47:59 14 Q. That's not the head and shoulder.

15:48:02 15 A. Well I -- I should include that then.

15:48:04 16 Q. Okay. So now we got the head and shoulder,
15:48:07 17 the arm. Do you know where the air escaped? Does it
15:48:11 18 escape --

15:48:13 19 Do you know how it's set up in an operating
15:48:13 20 room?

15:48:13 21 A. None other than the way observed here.

15:48:16 22 Q. Well doctor, you -- you -- you're here as an
15:48:19 23 expert to say, hey, look at this report, this is what
15:48:22 24 happens in an operating room. You agree with me this
15:48:26 25 is nowhere near what happens in an operating room;

15:48:28 1 correct?

15:48:28 2 MR. GOSS: Object to the form.

15:48:29 3 A. I'm not claiming this is what happens in an

15:48:31 4 actual operating room.

15:48:34 5 Q. Okay. What's the longest time you had the

15:48:36 6 Bair Hugger on? How long did you have the Bair Hugger

15:48:38 7 on?

15:48:41 8 A. Maybe an hour, hour and a half.

15:48:42 9 Q. It was on continuously for an hour, hour and

15:48:45 10 a half.

15:48:45 11 A. Yes.

15:48:45 12 Q. Where -- where does it say that in the

15:48:47 13 report?

15:48:47 14 A. It doesn't.

15:48:48 15 Q. So how do I know that?

15:48:50 16 MR. GOSS: He just testified to it.

15:48:52 17 Q. Besides your testimony, how do I know that?

15:48:54 18 A. Not other than my testimony.

15:48:57 19 Q. At what time -- how long was the Bair Hugger

15:48:59 20 on when you --

15:49:01 21 If you go to the "3 Inches Over Hip" where

15:49:05 22 it says "Off -- par -- Off -- parallel, Off --

15:49:09 23 perpendicular, On -- parallel, On -- perpendicular, On

15:49:12 24 -- parallel, parallel, parallel," how long was the

15:49:15 25 Bair Hugger on before you started taking those

15:49:17 1 measurements?

15:49:18 2 A. Where are you? Back on the hip page?

15:49:20 3 Q. Uh-huh.

15:49:25 4 A. I do not record that information, so I -- I

15:49:30 5 do not recall.

15:49:31 6 Q. So I -- I -- I mean you don't recall, so

15:49:33 7 sitting here today I cannot determine the methodology

15:49:36 8 used and reproduce what you did in this case; correct?

15:49:39 9 MR. GOSS: Objection to form.

15:49:40 10 Q. Because you don't know.

15:49:43 11 MR. GOSS: Wait for him to ask a question.

15:49:48 12 Q. You don't know, do you, what you did

15:49:53 13 sitting here today?

15:49:53 14 MR. GOSS: Object to form.

15:49:57 15 A. I do, but not some of the details you're

15:49:59 16 asking about.

15:50:01 17 Q. Well details are important; isn't it?

15:50:05 18 A. Yes.

15:50:05 19 Q. I mean would you accept a report like this

15:50:07 20 from one of your students doing a thesis for a Ph.D.?

15:50:13 21 A. Not solely, no.

15:50:14 22 Q. I mean you'd expect some sort of methodology

15:50:18 23 and some way to determine that the data is reliable;

15:50:22 24 correct? Correct?

15:50:22 25 A. Yes.

250

15:50:22 1 Q. Okay. There's definitely no methodology
15:50:25 2 here that's indicated in this report; correct?
15:50:27 3 A. Yes.
15:50:28 4 Q. And as of right now, the reliability is very
15:50:31 5 questionable; correct?
15:50:32 6 MR. GOSS: Objection to form, asked and
15:50:36 7 answered.
15:50:36 8 A. I would -- I would say reproducing the
15:50:39 9 results here would -- would be difficult.
15:50:41 10 Q. And therefore, if you can't reproduce the
15:50:43 11 results, not reliable.
15:50:45 12 MR. GOSS: Objection to form, asked and
15:50:47 13 answered.
15:50:47 14 Q. Correct?
15:50:48 15 A. I think I answered that.
15:50:50 16 Q. Correct?
15:50:52 17 MR. GOSS: Objection to form, asked and
15:50:54 18 answered.
15:50:54 19 A. I think I answered that.
15:50:56 20 Q. Are you afraid to answer this question
15:50:58 21 again? It's a simple question.
15:50:59 22 MR. GOSS: Objection, argumentative,
15:51:00 23 badgering.
15:51:01 24 MR. ASSAAD: Counsel, tell him to answer the
15:51:03 25 question.

15:51:03 1 MR. GOSS: No.

15:51:03 2 MR. ASSAD: Tell your expert to answer the

15:51:06 3 question.

15:51:06 4 MR. GOSS: No, I'm not going to.

15:51:06 5 MR. ASSAAD: Oh, really?

15:51:07 6 MR. GOSS: I'm not going to tell him to

15:51:09 7 answer the question. He's already answered it.

15:51:11 8 MR. ASSAAD: No, he hasn't.

15:51:13 9 Q. I'm asking as a --

15:51:13 10 I didn't ask for one specific data, I'm

15:51:14 11 asking data as a whole. Since there's no methodology

15:51:17 12 and it's not reproducible, therefore it can't be

15:51:20 13 reliable; correct?

15:51:21 14 MR. GOSS: You can't --

15:51:21 15 You haven't gone over all the data.

15:51:22 16 MR. ASSAAD: I don't need to go over --

15:51:24 17 Q. Exhibit B of your report, there's no

15:51:28 18 methodology, can't be reproducible, therefore it's not

15:51:32 19 reliable; correct?

15:51:33 20 MR. GOSS: Objection, asked and answered.

15:51:35 21 A. If -- if that's how you define "reliable," I

15:51:38 22 will agree with that.

15:51:40 23 Q. Well how do you define "reliable?"

15:51:46 24 A. I think I would say something that -- that

15:52:04 25 could be reproduced.

252

15:52:05 1 Q. We can't reproduce this; can we?

15:52:07 2 A. Not with what's here, no.

15:52:09 3 Q. Okay. So therefore this report, based on

15:52:12 4 what's here, is not reliable.

15:52:13 5 MR. GOSS: Objection to form.

15:52:15 6 A. By inference, yes, I agree.

15:52:19 7 MR. ASSAAD: Let's take a break.

15:52:19 8 THE REPORTER: Off the record, please.

16:01:46 9 (Recess taken.)

16:01:46 10 BY MR. ASSAAD:

16:01:58 11 Q. You don't consider yourself an expert with

16:02:01 12 respect to how skin squames are transported in an

16:02:06 13 operating room; correct?

16:02:07 14 A. That's true.

16:02:12 15 Q. You are aware that skin squames carry

16:02:20 16 bacteria; correct?

16:02:21 17 A. Yes.

16:02:22 18 Q. And are you aware that between one million

16:02:26 19 to 900 million skin squames are shed during a typical

16:02:31 20 surgery?

16:02:31 21 A. I do not -- have not heard that number

16:02:33 22 before.

16:02:52 23 Q. Are you familiar with the HVAC Design Manual

16:02:54 24 for Hospitals and Clinics?

16:02:55 25 A. The ASHRAE --

253

1 Q. Yes.

16:02:57 2 A. -- Hospital Design Guide? Yes, I am.

16:03:00 3 Q. And actually one of the contributors was Dan

16:03:05 4 Koenigshofer?

16:03:06 5 A. Yes.

16:03:09 6 Q. Have you read the HVAC Design Manual for

16:03:30 7 Hospitals and Clinics recently?

16:03:31 8 A. I have --

16:03:32 9 I don't think I'd read it prior to this --

16:03:35 10 this case, no.

16:03:35 11 Q. But you agree to -- for it to be

16:03:38 12 authoritative, correct, in your -- in your field of

16:03:41 13 work?

16:03:42 14 A. In my opinion, yes, sir.

16:03:44 15 Q. Okay.

16:03:52 16 (Kuehn Exhibit 13 was marked for

16:03:57 17 identification.)

16:03:57 18 MR. ASSAAD: Did you say 13?

16:04:01 19 THE REPORTER: Yes.

16:04:03 20 BY MR. ASSAAD:

16:04:04 21 Q. Now if you look on page v or five, Table of

16:04:10 22 Contents --

16:04:12 23 And I represent to you that I -- that I did

16:04:15 24 not print out the entire manual, just some relevant

16:04:18 25 parts. Fair enough?

254

16:04:19 1 A. Yes.

16:04:19 2 Q. I'd like you to turn to page 27. And it's

16:04:31 3 not in order, actually. The page after that.

16:04:37 4 A. Okay.

16:04:39 5 Q. If you look at the highlighted section, it

16:04:42 6 states here, "Between 1 million and 900 million

16:04:45 7 squames are shed during surgery." Do you see that?

16:04:49 8 A. That's what it says.

16:04:49 9 Q. Okay. Do you disagree with that?

16:04:52 10 A. I do not disagree with that.

16:04:53 11 Q. And actually, since you agreed this is

16:04:56 12 authoritative, you must agree with it; correct?

16:04:58 13 A. Yes.

16:05:01 14 Q. Go to page 26, last paragraph. States,

16:05:12 15 "Operating rooms are one of the most critical areas

16:05:15 16 for infection control..." Do you agree with that?

16:05:17 17 A. I do.

16:05:18 18 Q. Continues, "...this is where patients are

16:05:20 19 opened to the surrounding environment while in an

16:05:22 20 immune-suppressed condition." Do you agree with that?

16:05:25 21 A. Yes.

16:05:26 22 Q. "The patient is vulnerable to attack from

16:05:29 23 any infectious agents that get into the room and into

16:05:31 24 the surgical site." Do you agree with that?

16:05:35 25 A. Yes.

255

16:05:38 1 Q. Also like you to turn to page 154, upper
16:05:56 2 left-hand corner. Are you there?
16:05:58 3 A. Yes.
16:05:58 4 Q. Under 8.3 it discusses operating rooms.
16:06:00 5 Have you read this section before?
16:06:01 6 A. I believe I have.
16:06:02 7 Q. First sentence, "The purposes of the HVAC
16:06:04 8 system in an operating room are to minimize infection,
16:06:08 9 maintain staff comfort, and maintain patient comfort."
16:06:12 10 Did I read that correctly?
16:06:13 11 A. You did read that correctly.
16:06:15 12 Q. Do you agree with that?
16:06:16 13 A. I do.
16:06:16 14 Q. Now you agree with me that ASHRAE is a
16:06:21 15 standard -- a -- a minimum standard; correct?
16:06:25 16 MR. GOSS: Objection, form.
16:06:26 17 A. It's intended to be a minimum standard, yes.
16:06:28 18 Q. Okay. It doesn't mean it's the best
16:06:31 19 practice, it's just a minimum standard; correct?
16:06:33 20 MR. GOSS: Objection to form, vague.
16:06:34 21 A. That's typically the way -- well, this is
16:06:41 22 a --
16:06:42 23 This is not an ASHRAE standard, it's an HVAC
16:06:45 24 Design Manual for Hospitals and Clinics, so I would
16:06:47 25 say this would be best practice.

256

16:06:48 1 Q. Okay. And you agree that ASHRAE, any of the
16:06:56 2 standards or best practices do not apply to medical
16:07:00 3 devices; correct?

16:07:01 4 A. I believe that's a correct statement.

16:07:04 5 Q. So to determine or to select a filter for a
16:07:13 6 medical device, you have to look at how the medical
16:07:19 7 device is used and the environment of use; correct?

16:07:22 8 A. That's correct.

16:07:23 9 Q. Okay. The ASHRAE standard has -- is not
16:07:28 10 applicable at all to medical devices such as the Bair
16:07:32 11 Hugger; correct?

16:07:33 12 A. It was not intended to be used for medical
16:07:36 13 devices.

16:07:36 14 Q. Go to page 157. There's a diagram that's
16:07:51 15 highlighted. That's an operating room, --

16:07:54 16 A. Yes.

16:07:55 17 Q. -- a schematic of an operating room;

16:07:57 18 correct?

16:07:57 19 A. Yes.

16:07:58 20 Q. Are you familiar with how an HVAC system
16:08:00 21 works in an operating room?

16:08:01 22 A. Not having worked with operating rooms
16:08:03 23 personally, I rely on documents such as this.

16:08:06 24 Q. How many filters does -- does the air go
16:08:08 25 through before it enters an operating room?

16:08:10 1 A. I would -- as --

16:08:11 2 As what I have read, it's typically two.

16:08:13 3 Q. Okay. There's a -- there's a prefilter,

16:08:16 4 which is usually like a MERV 7, and then the MERV 14

16:08:20 5 filter; correct?

16:08:20 6 A. Yes.

16:08:21 7 Q. Okay. And you agree with me that an

16:08:26 8 operating room ventilation system is not drawing from

16:08:30 9 air below the operating room table; correct?

16:08:36 10 A. Say that again.

16:08:37 11 Q. It's not drawing -- the intake that --

16:08:40 12 The air where it's drawing from is not from

16:08:42 13 below the operating room table; correct?

16:08:45 14 A. It's -- it's not from below the table, it's

16:08:45 15 from below sidewall return grilles.

16:08:48 16 Q. And it's usually about 75 percent recycled

16:08:51 17 air and 25 percent fresh air; correct?

16:08:53 18 A. I recall 80/20, but you may be correct.

16:08:57 19 Q. 80/20, depending on the system.

16:08:59 20 A. Yes.

16:08:59 21 Q. Okay. And you agree with me that in this

16:09:02 22 picture here it talks about the heat sources that are

16:09:08 23 typical in an operating room; correct?

16:09:09 24 A. It does, yeah.

16:09:10 25 Q. Talks about the equipment of one kilowatt;

16:09:13 1 correct?

16:09:13 2 A. Yes.

16:09:14 3 Q. All right. And how many watts is the Bair

16:09:18 4 Hugger for producing -- how much --

16:09:19 5 How many watts of heat is it producing?

16:09:23 6 A. Off the top of my head I -- I --

16:09:26 7 I could hazard a guess, but I don't want to

16:09:28 8 give you an exact number. I don't recall.

16:09:30 9 Q. Would that be something important to know,

16:09:33 10 the effect of --

11 A. It -- it -- it --

12 Yes.

16:09:35 13 Q. -- of a unit in an operating room?

16:09:36 14 A. Yes.

16:09:36 15 Q. But you don't know that information sitting

16:09:39 16 here today.

16:09:41 17 A. I could -- I could hazard a guess, but I

16:09:42 18 don't know the exact number.

16:09:43 19 Q. Again, I don't want guessing, I want your

16:09:45 20 expert opinion.

16:09:46 21 A. Okay. I cannot give you an exact number at

16:09:48 22 this point.

16:09:48 23 Q. You agree that people produce heat; correct?

16:09:52 24 A. Yes.

16:09:53 25 Q. And that should be taken into account of --

1 of --

16:09:57 2 Well let's put it this way: When you look

16:09:57 3 at a problem, you have to look at the whole picture;

16:10:00 4 correct?

16:10:00 5 A. Yes.

16:10:01 6 Q. You can't just take a -- a Bair Hugger and

16:10:06 7 put it in isolation and not take into account the

16:10:12 8 barriers in airflow of the operating room and how many

16:10:15 9 people are in the operating room and the devices in

16:10:17 10 the operating room; correct?

16:10:18 11 A. That would be my assumption, yes.

16:10:20 12 Q. Okay. And you did not do that in this case;

16:10:23 13 correct? You didn't take into account the people in

16:10:25 14 the operating room; correct?

16:10:27 15 MR. GOSS: With respect to what part of the

16:10:29 16 report?

16:10:29 17 MR. ASSAAD: Any of the studies he's done,

16:10:31 18 any of the testing he did.

16:10:32 19 A. The only testing I did was with -- with the

16:10:34 20 Bair Hugger.

16:10:36 21 Q. So you didn't take any of the people into

16:10:37 22 account; correct?

16:10:38 23 A. Not with those tests, no.

16:10:48 24 Q. Do you know why medical devices are --

16:11:07 25 strike that.

260

16:11:08 1 Do you know why prosthetic surgeries or
16:11:13 2 orthopedic surgeries have a higher risk of surgical-
16:11:17 3 site infection?

16:11:17 4 A. Not being a surgeon, I really can't answer
16:11:21 5 that.

16:11:21 6 Q. Do you know whether or not the number of --
16:11:25 7 number of bacteria required to cause a periprosthetic
16:11:28 8 joint infection is the same as a superficial knee
16:11:31 9 infection?

16:11:32 10 A. I --

16:11:33 11 Again, not being a surgeon or
16:11:39 12 microbiologist, I -- I cannot comment on that.

16:11:43 13 Q. Now you've read Dr. Elghabashi's report;
16:11:50 14 correct?

16:11:50 15 A. His report, yes.

16:11:53 16 Q. Okay. Do you understand his report?

16:11:53 17 A. I do.

16:11:54 18 Q. Okay. You've gone through all the
16:11:55 19 calculations or the equations?

16:11:58 20 A. Not in sufficient detail, but I -- I get
16:12:01 21 them, that he's done it correctly.

16:12:03 22 Q. Okay. So you agree with me that all the
16:12:05 23 calculations that Elghabashi has done with respect to
16:12:09 24 the analysis of an operating room was done correctly.

16:12:12 25 A. With the exception of the assumption of 106-

16:12:15 1 degree Fahrenheit air leaving the blanket, which I
16:12:18 2 don't think is correct.

16:12:19 3 Q. Okay. That's the only criticism you have of
16:12:21 4 his report.

16:12:22 5 A. No. I also criticized the number of
16:12:24 6 particles he assumed was getting at the -- into the
16:12:29 7 critical-care area, the infection box.

16:12:31 8 Q. And why do you criticize that?

16:12:33 9 A. He lists very large numbers of particles
16:12:39 10 originating near the floor ending up near the -- near
16:12:44 11 the critical-care area when the Bair Hugger was on,
16:12:47 12 and my criticism of that was the -- it's approximately
16:12:53 13 a million particles near the floor that he's using in
16:12:56 14 his calculations to arrive at his number near the
16:12:59 15 critical-air area.

16:13:00 16 Q. Okay. What number should he have used?

16:13:03 17 A. I -- I suggest he use the most appropriate
16:13:09 18 value of CFU of bacteria aerosols per cubic meter per
16:13:15 19 cubic foot that's available in the literature.

16:13:17 20 Q. And that you found was 10 CFU's per cubic --
16:13:21 21 per cubic meter?

16:13:22 22 A. I went back to Galson and Goddard, the
16:13:27 23 number I included in my report, which I think is -- is
16:13:30 24 high, but I used that as a starting point.

16:13:32 25 Q. Which was what?

262

16:13:33 1 A. I have to look in my report.

16:13:36 2 Q. Please do.

16:15:23 3 Let me help you out here. Let's go to page

16:15:25 4 13 of your report.

16:15:26 5 A. I -- I -- yes. Thank you. I found page 13.

16:15:28 6 I was looking at the exhibits and it wasn't there.

16:15:42 7 I see the number four CFU per cubic foot.

16:15:46 8 Q. Okay. What would that be per cubic meter?

16:15:48 9 A. Roughly -- it would be roughly 10 times

16:15:57 10 that.

16:15:58 11 Q. So about 40?

16:16:00 12 A. Roughly 40, yes.

16:16:01 13 Q. Okay. And you got this number from where?

16:16:08 14 A. From --

16:16:10 15 This was published years ago by a reference,

16:16:14 16 Galson and Goddard, an ASHRAE journal article.

16:16:17 17 Q. So we just read ASHRAE, which you consider

16:16:20 18 authoritative, that said between 100 and 900 million

16:16:25 19 skin squames fall during a typical surgery; correct?

16:16:28 20 A. That's what it said, yes.

16:16:29 21 Q. Okay. And you don't disagree with that;

16:16:32 22 correct?

16:16:32 23 A. No.

16:16:32 24 Q. Okay. And Elghabashi used three million,

16:16:36 25 correct, skin squames?

263

16:16:36 1 A. His total particle count, yes, I think it
16:16:39 2 was three.

16:16:39 3 Q. One -- one million in each section; correct?

16:16:43 4 A. That's -- that's my understanding.

16:16:45 5 Q. That's on the lower side of 900 million;

16:16:48 6 correct?

16:16:48 7 A. Repeat the question.

16:16:49 8 Q. I mean three million is much lower than 900

16:16:53 9 million.

16:16:53 10 A. Yes.

16:16:53 11 Q. Okay. And the squim -- the squib scale --

16:16:57 12 The skin squames, they fall from the patient

16:17:01 13 as well as the surgical staff; correct?

16:17:01 14 A. Yes.

16:17:02 15 Q. They're around the operating room; correct?

16:17:04 16 A. Yes.

16:17:04 17 Q. Do you know whether or not the value taken

16:17:07 18 by Galson and Goddard were underneath the operating

16:17:09 19 room table around the surgical site, or just the

16:17:13 20 average in an OR?

16:17:14 21 A. I -- I do not know the precise location for

16:17:16 22 their measurement.

16:17:17 23 Q. That would be kind of important, wouldn't

16:17:18 24 it, before you criticize another expert in this case?

16:17:23 25 MR. GOSS: Objection to form.

264

16:17:25 1 A. Well yes.

16:17:27 2 Q. I mean -- I mean we know at least one

16:17:30 3 million skin squames fall during a typical surgery

16:17:33 4 according to authoritative ASHRAE.

16:17:35 5 A. Yes.

16:17:35 6 Q. Okay. So --

16:17:40 7 And Dr. Elghabashi has never stated in his

16:17:43 8 report that those were colony-forming units, he just

16:17:49 9 said they were skin squames; correct?

16:17:51 10 A. I think he defined them as 10-micron

16:17:55 11 particles.

16:17:55 12 Q. Okay. He didn't say they were bacteria or

16:17:56 13 CFUs, he just said they were skin squames; correct?

16:17:59 14 A. Well as I recall he called them 10-micron

16:18:01 15 particles.

16:18:01 16 Q. Do you understand how he calculated them to

16:18:05 17 be 10-micron particles?

16:18:06 18 A. I -- I don't know how he arrived at it.

16:18:07 19 Q. Did you not look at his appendix in -- in

16:18:10 20 his report?

16:18:10 21 A. I cannot recall that at the moment.

16:18:12 22 Q. Okay. And are you aware that Farhad

16:18:21 23 Memarzadeh, as I like to call him, also used a 10-

16:18:23 24 micron sphere as a shape that would be equivalent to a

16:18:29 25 skin squame?

265

16:18:31 1 A. I don't recall seeing that article. I can't
16:18:33 2 comment on that.

16:18:34 3 Q. Are you aware that 3M cites that article on
16:18:37 4 numerous letters that they send to their valued
16:18:43 5 customers, doctors?

16:18:44 6 A. -- I am not aware of that, no.

16:18:46 7 Q. You haven't seen any of those documents;
8 have you?

16:18:49 9 A. I have not.

16:18:49 10 Q. Okay. And do you understand why he used a
16:18:53 11 10-micron particle?

16:18:55 12 A. Yes.

16:18:55 13 Q. Why?

16:18:56 14 A. That -- that's a particle that could contain
16:19:00 15 infectious bacteria.

16:19:01 16 Q. Do you know why he used a spherical particle
16:19:05 17 instead of the shape of a skin squame?

16:19:07 18 A. It's much easier to calculate in terms of
16:19:10 19 the numerical methodology.

16:19:14 20 Q. Are -- are you --
21 Can CFD calculate particle movements that
16:19:19 22 are not spheres?

16:19:20 23 A. It's very difficult. Typically, what one
16:19:24 24 does is use what's called aerodynamic diameters, which
16:19:28 25 takes into account the particle shape, density, and

16:19:31 1 that sort of thing.

16:19:31 2 Q. Exactly. And that's why you use a 10-micron

16:19:35 3 sphere. And if you look at his calculation, that's

16:19:37 4 how he calcu -- that's the aerodynamic diameter of a

16:19:40 5 skin squame, of an average skin squame. Do you agree

16:19:44 6 with that?

16:19:44 7 A. I -- I don't -- I don't know that I've seen

16:19:46 8 that information, but that seems reasonable.

16:19:48 9 Q. Okay. You don't disagree with the 10-micron

16:19:50 10 size.

16:19:50 11 A. I don't disagree with it.

16:19:53 12 Q. Okay. So the two things that you disagree

16:19:54 13 with Elghabashi are the amount of skin squames -- or

16:19:58 14 particles on the floor --

16:20:00 15 Were they on the floor or above the floor?

16:20:01 16 A. Above the floor. They were in a given

16:20:03 17 volume.

16:20:03 18 Q. Huh?

16:20:04 19 A. They were in a specified volume above the

16:20:06 20 floor.

16:20:06 21 Q. But they weren't on the floor.

16:20:10 22 A. No.

16:20:10 23 Q. Do you know why he didn't put them on the

16:20:10 24 floor?

16:20:10 25 A. I -- I -- I do not know his reasoning, no.

16:20:13 1 Q. Okay. And the other criticism is the
16:20:16 2 temperature coming out of the blanket.

16:20:17 3 A. Yes.

16:20:18 4 Q. Okay. And that's based on your own
16:20:23 5 measurements that you did in Exhibit B; correct?

16:20:25 6 A. Yes.

16:20:25 7 Q. Okay. So what's your basis, if we're just
16:20:42 8 talking about particles or skin squames -- squames,
16:20:46 9 that using three million around the operating table is
16:20:52 10 unreasonable when ASHRAE states that between one --
16:20:57 11 one million to 900 million are shed during surgery?

16:21:02 12 A. Well "shed during surgery" means the entire
16:21:04 13 duration of the surgical procedure I would assume, you
16:21:06 14 know, so therefore, since the room air is changing
16:21:09 15 every -- or there's 15 to 20 air changes per hour,
16:21:14 16 then most of these would follow airflow out of the
16:21:16 17 room or be deposited on surfaces.

16:21:19 18 Q. What's the airflow underneath the operating
16:21:23 19 room table?

16:21:23 20 A. The air change rate's probably quite low.

16:21:28 21 Q. Is there any change -- air-change rate?

16:21:30 22 A. There's probably some.

16:21:32 23 Q. Very minimal; would you agree?

16:21:34 24 A. That's -- that's -- that's probably true.

16:22:07 25 (Kuehn Exhibit 14 was marked for

16:22:09 1 identification.)

16:22:09 2 BY MR. ASSAAD:

16:22:10 3 Q. Dr. Kuehn, I represent that Exhibit 14 is a

16:22:15 4 CFD image -- or an image produced by CFD by defense

16:22:20 5 expert Dr. Abraham. Have you seen this document

16:22:23 6 before?

16:22:23 7 A. I have not.

16:22:26 8 Q. Do you understand what this document is by

16:22:28 9 looking at it as a -- as an engineer?

16:22:31 10 A. I have a rough idea, yes.

16:22:34 11 Q. Would you agree with me that's airflow based

16:22:37 12 on a CFD analysis of an operating room? Correct?

16:22:40 13 A. I'm not sure I have the entire image here.

16:22:45 14 Looks like the walls are missing on the left- and

16:22:49 15 right-hand sides.

16:22:49 16 Q. But it's airflow in an operating room with

16:22:52 17 there being a surgical table and a patient and lights

16:22:54 18 and everything.

16:22:55 19 A. That's what it looks like, yeah.

16:22:57 20 Q. And that's what I represent to you, that

16:22:58 21 this was produced to us by defense in this case.

16:23:01 22 Do you see the -- the vectors of air

16:23:05 23 underneath the operating room table?

16:23:08 24 A. Yes.

16:23:08 25 Q. You see that it's very turbulent underneath

16:23:11 1 there; correct?

16:23:12 2 A. A lot of recirculation, yes.

16:23:14 3 Q. And this supports your opinion that there's

16:23:16 4 probably very little air exchange underneath the

16:23:19 5 operating room table; correct?

16:23:20 6 A. Well less than the other parts of the room.

16:23:24 7 Q. Much less.

16:23:24 8 A. It would also depend on the -- the drapes

16:23:26 9 hanging down, how -- how far the edge of the drapes

16:23:29 10 are above the floor.

16:23:30 11 Q. The longer the drapes, the less --

16:23:33 12 A. Less --

16:23:33 13 Q. -- air exchange; correct?

16:23:35 14 A. Yes.

16:23:35 15 Q. And it creates more of an insulation from

16:23:37 16 the air.

16:23:38 17 A. Yes.

16:23:38 18 Q. Okay. And when you have insulation, you

16:23:40 19 have less airflow going in and out of the area

16:23:42 20 underneath the drapes; correct?

16:23:44 21 A. Yes.

16:23:44 22 Q. Okay. And since you have less airflow going

16:23:48 23 in and out of the drapes, you have less of a cooling

16:23:51 24 effect; correct?

16:23:51 25 A. Less --

270

16:23:53 1 Q. Well the air is pretty -- pretty stagnant
16:23:57 2 underneath the operating room table if the drapes are
16:23:59 3 long; correct?
16:23:59 4 A. Yes.
16:24:00 5 Q. Okay. And you have the Bair Hugger that's
16:24:01 6 underneath the drapes that's heating up that area;
16:24:03 7 correct?
16:24:04 8 MR. GOSS: Objection, form.
16:24:05 9 A. That's not the way we set our Bair Hugger
16:24:07 10 up.
16:24:08 11 Q. Oh, it isn't?
16:24:09 12 A. No.
16:24:09 13 Q. Why not?
16:24:10 14 MR. GOSS: Are you talking about the blanket
16:24:11 15 or the warming unit?
16:24:13 16 MR. ASSAAD: The blanket.
16:24:15 17 A. Oh, the blanket. I'm sorry. I thought you
16:24:16 18 meant the -- the warming unit.
16:24:17 19 Q. No. The blanket's underneath the drapes;
16:24:20 20 correct?
16:24:20 21 A. Yes.
16:24:20 22 Q. Okay. And you agree with me at some point,
16:24:23 23 you know, the Bair Hugger blanket is going to warm the
16:24:27 24 actual drapes on top through conduction; correct?
16:24:31 25 A. Yes.

271

16:24:31 1 Q. Okay. And by convection it's going to warm
16:24:35 2 the patient as well as underneath the drapes; correct?

16:24:39 3 A. Yes.

16:24:43 4 Q. Okay. And over time the air underneath the
16:24:47 5 drapes is going to increase; correct?

16:24:49 6 A. That's possible.

16:24:54 7 Q. Well if you have the drapes around the
16:24:58 8 table, okay, and you're getting very little air
16:25:01 9 movement underneath the table, by the first law of
16:25:04 10 thermodynamics, the conservation of energy, okay, the
16:25:10 11 heat has to warm up something; correct?

16:25:12 12 A. Well it depends on where the air is actually
16:25:15 13 leaving the blanket with respect to the drapes.

16:25:17 14 Q. Do you think the air could pass through the
16:25:19 15 drapes?

16:25:20 16 A. No.

16:25:21 17 Q. Okay. So we know the air is not leaving
16:25:23 18 through the drapes; correct?

16:25:24 19 A. Yes.

16:25:24 20 Q. And the drapes act like some sort of
16:25:27 21 insulation, kind of like when you all have blankets on
16:25:31 22 us at night, it acts like an insulation; correct?

16:25:34 23 A. Yes.

16:25:35 24 Q. That's why --
16:25:35 25 I mean when you sleep at night, the blankets

272

16:25:39 1 don't warm you up, your own body heat warms you up, it
16:25:41 2 just acts as an insulator to keep you warm; correct?
16:25:43 3 A. Yes.
16:25:43 4 Q. The same concept applies here with the Bair
16:25:46 5 Hugger, correct, and the drapes?
16:25:47 6 A. Yes. The Bair Hugger is providing warmth to
16:25:50 7 the patient, yes.
16:25:51 8 Q. And the drape is keeping all the -- it's --
16:25:52 9 it's insulating the patient and the area underneath
16:25:56 10 the drapes from the cold air up top; correct?
16:26:00 11 A. Yes.
16:26:02 12 Q. Okay. The only way that that cold air
16:26:05 13 coming in from the ceiling could warm up the air
16:26:10 14 underneath the operating room table is either by
16:26:13 15 having air coming in from the sides underneath the
16:26:17 16 drapes --
16:26:17 17 Correct?
16:26:19 18 A. Yes.
16:26:19 19 Q. -- or it warms the air -- warms the blanket
16:26:21 20 by convection and then the blanket -- the drape, I'm
16:26:25 21 sorry, warmed by con -- convection, and then the drape
16:26:29 22 warms the Bair Hugger blanket by convection and cools
16:26:37 23 it down to blow cold air, which doesn't happen in real
16:26:40 24 life; correct?
16:26:40 25 A. Yes.

16:26:41 1 Q. Okay. So over time energy has --

16:26:48 2 Energy, first law of thermodynamics, is

16:26:51 3 conserved, and the area underneath the operating room

16:26:54 4 table, which is -- doesn't have a significant amount

16:26:57 5 of air exchanges, gets warmer and warmer, correct,

16:27:01 6 until it reaches an equilibrium?

16:27:02 7 A. I'll agree with that.

16:27:03 8 Q. Okay. And sitting here today, you don't

16:27:31 9 disagree with Dr. Abraham's CFD analysis as shown in

16:27:36 10 Exhibit 14; correct?

16:27:38 11 A. Well not having looked at any of the other

16:27:41 12 background information or boundary conditions, just

16:27:44 13 given this one figure, this figure's results look

16:27:48 14 reasonable, but I'd really like to look at the other

16:27:50 15 part of his report before I answered that question.

16:27:52 16 Q. And you never asked for his report from 3M;

16:27:56 17 have you?

16:27:56 18 A. I --

16:27:57 19 No, I did not.

16:28:07 20 Q. Do you know how much heat -- what's the

16:28:17 21 right term?

16:28:26 22 Do you know how much heat is absorbed by a

16:28:28 23 human body in the torso region?

16:28:31 24 A. I do not know that.

16:28:33 25 Q. Okay. Would that be something important to

16:28:37 1 know to determine how much of the heat produced by the
16:28:39 2 Bair Hugger is actually absorbed by the body and how
16:28:42 3 much of it's waste heat?

16:28:44 4 MR. GOSS: I don't think he's offering any
16:28:46 5 opinions on that, but you can answer.

16:28:49 6 A. If -- if I was in the design area, I think
16:28:52 7 that would be something I would want to know.

16:29:11 8 Q. You're aware that there's different patient
16:29:15 9 warming products --

16:29:17 10 A. Yes.

16:29:17 11 Q. -- as we discussed previously.

16:29:19 12 A. Yes.

16:29:20 13 Q. They're just different designs; correct?

16:29:23 14 A. Yes.

16:29:24 15 Q. One design might be forced-air warming;
16:29:26 16 correct?

16:29:26 17 A. Yes.

16:29:26 18 Q. Another design might be conductive warming;
16:29:29 19 correct?

16:29:29 20 A. Yes.

16:29:30 21 Q. You've heard of conductive warming
16:29:32 22 mattresses; correct?

16:29:33 23 A. I believe so, yes.

16:29:33 24 Q. Okay. They're all patient warming products;
16:29:37 25 correct?

275

16:29:37 1 A. Yes.

16:29:38 2 Q. Just a different design; correct?

16:29:39 3 A. Right.

16:29:39 4 Q. And that's based -- and -- and that's an

16:29:41 5 engineer -- that's that they're --

16:29:43 6 They're the same product with different

16:29:44 7 design; correct?

16:29:45 8 A. Same --

16:29:46 9 Q. Product. They're both pat --

16:29:48 10 They're all patient warming products;

16:29:49 11 correct?

16:29:49 12 A. Same -- same application --

16:29:50 13 Q. Yes.

16:29:50 14 A. -- but just different products.

16:29:56 15 Q. Different products or different designs?

16:29:56 16 A. Well different designs and different

16:29:58 17 products.

16:29:58 18 Q. What's different between the Mistral and the

16:30:00 19 Bair Hugger?

16:30:01 20 A. I have not looked at the Mistral in any

16:30:03 21 amount of detail, so I -- I can't answer that.

16:30:07 22 Q. There's three modes of heating: convective,

16:30:11 23 conductive, and radiation; correct?

16:30:13 24 A. Yes.

16:30:23 25 Q. Do you know a Dr. Sparrow?

16:30:24 1 A. I do.

16:30:25 2 Q. Are you friends with him?

16:30:26 3 A. We're colleagues, yeah.

16:30:29 4 Q. Have you done any work with him?

16:30:30 5 A. No, not -- not really, other than I may have

16:30:36 6 served on some of his graduate students' final exam

16:30:39 7 committees.

16:30:42 8 Q. And he focuses on heat transfer as well;

16:30:43 9 correct?

16:30:43 10 A. Yes.

16:30:46 11 Q. Is there anyone at the University of

16:30:47 12 Minnesota that focuses on particle movement through

16:30:53 13 turbulent airflow?

16:30:57 14 A. I could think of Mike Zacharia probably,

16:31:00 15 does a lot of modeling work in that area.

16:31:02 16 Q. Is he from Stanford?

16:31:04 17 A. No, I think he's from the University of New

16:31:09 18 York - Buffalo.

16:31:10 19 Q. Okay.

16:31:42 20 A. What name did I give you? I just want to

16:31:45 21 make sure I gave you the correct --

16:31:47 22 Q. Zacharia.

16:31:47 23 A. That's -- that's not correct.

16:31:52 24 MS. ZIMMERMAN: University of Minnesota is a

16:31:53 25 big school.

16:31:54 1 THE WITNESS: Yeah.

16:31:55 2 A. I'm just having a mental --

16:31:58 3 I'll -- I'll -- I'll come up with it.

16:32:00 4 Q. Not important.

16:32:01 5 A. I'll come up with it.

16:32:03 6 Q. It's not important.

16:32:04 7 A. Oh. Sean Garrick is -- G-a-r-r-i-c-k, I

16:32:09 8 believe. Sean Garrick.

16:32:10 9 Q. And he went to SUNY Buffalo?

16:32:13 10 A. Yes.

16:32:15 11 Q. Okay. Do you know whether or not the

16:32:17 12 University of Minnesota has their own CFD code?

16:32:21 13 A. I don't think so, but I'm not -- not aware

16:32:25 14 of that.

16:32:25 15 Q. Are you aware that like universities such as

16:32:28 16 Stanford have their own code?

16:32:30 17 A. Yes.

16:32:31 18 Q. Okay.

16:32:32 19 A. I -- not --

16:32:33 20 Not that I'm aware of.

21 Q. Okay.

16:32:37 22 A. I mean individual researchers have their own

16:32:40 23 code, but whether there's a blanket University of

16:32:44 24 Minnesota code, I am not aware of any such thing.

16:33:04 25 Q. Now you agree with me that in selecting a

16:33:16 1 filter to be used in a -- in a device during the
16:33:19 2 design process, you have to know how that device is
16:33:23 3 going to be used; correct?

16:33:24 4 A. Yes.

16:33:25 5 Q. And you agree with me that that -- that
16:33:29 6 that -- the air that the bacteria -- strike that --
16:33:32 7 the air that the Bair Hugger is filtering has a higher
16:33:37 8 bacterial load than the air coming out of that
16:33:40 9 ventilation system; correct?

16:33:43 10 A. That -- that may be the case. I have not
16:33:46 11 seen data that supports that, I don't believe.

16:33:50 12 Q. Let's just use common sense. You have
16:33:53 13 squames from people and the patient and blood and
16:34:01 14 other stuff during the surgical procedure that's going
16:34:07 15 down to the floor of the operating room; correct?

16:34:09 16 A. Okay.

16:34:10 17 Q. Okay. I mean it would be a -- a reasonable
16:34:15 18 conclusion that the bacterial load in that area around
16:34:18 19 the surgical table is much greater than coming out of
16:34:22 20 the ventilation system, which has 25 percent air
16:34:25 21 coming from the outside as well as being filtered
16:34:28 22 twice through a -- through a HEPA -- a MERV -- a MERV
16:34:32 23 7 filter and a MERV 14 filter; correct?

16:34:34 24 A. That would be a logical assumption, yes.

16:34:37 25 Q. And that needs to be taken into account in

16:34:41 1 determining the filtration to be used by the device;

16:34:44 2 correct?

16:34:44 3 A. Yes. The -- the challenge aerosol into the

16:34:50 4 device would have to be taken into account, into the

16:34:51 5 filter.

16:34:51 6 Q. Because using a MERV 14 that removes 95

16:34:56 7 percent of the part -- of particles the size of -- or

16:35:07 8 90 percent -- 90 percent of the particles larger than

16:35:10 9 three to 10 microns means that some get through;

16:35:15 10 correct?

16:35:15 11 A. And the numbers you're referring to appear

16:35:17 12 to be from the ASHRAE Standard 52.2. Those are

16:35:20 13 minimum values for that particle-size range.

16:35:23 14 Q. That's fine. But --

16:35:28 15 It's a percentage; correct?

16:35:29 16 A. Yes.

16:35:30 17 Q. Okay. And you have to take into account in

16:35:34 18 designing a device, when you're putting a filter in

16:35:36 19 it, is what is the bacterial load, because allowing 10

16:35:43 20 percent of a low number to get through is different

16:35:45 21 than allowing 10 percent of a large number to get

16:35:48 22 through; correct?

16:35:49 23 A. Yes.

16:35:49 24 MR. GOSS: Object to form.

16:35:51 25 Q. And the bacterial load underneath the

280

16:35:55 1 operating room table is much greater than coming out
16:36:00 2 of the HVAC system; correct?

16:36:01 3 A. I think we could probably assume that.

16:36:03 4 Q. And you have to take that into consideration

16:36:06 5 in choosing the correct filter for the device;

16:36:11 6 correct?

16:36:11 7 A. Depends where the device is located.

16:36:13 8 Q. Well where is the Bair Hugger located?

16:36:16 9 A. Sometimes it's on an IV pole, sometimes it's

16:36:19 10 mounted on a cart.

16:36:20 11 Q. Either/or. Why does it make a difference?

16:36:22 12 A. The location of the air coming in will be

16:36:25 13 different than, for example, under the operating

16:36:28 14 table.

16:36:42 15 Q. Do you know how high, when you use it -- put

16:36:45 16 on a pole, how high it's off the ground, the Bair

16:36:48 17 Hugger?

16:36:49 18 A. Typically, the bottom I've heard is between

16:36:52 19 18 inches and two feet.

16:36:53 20 Q. Okay. And that's still below the operating

16:36:55 21 room table; correct?

16:36:56 22 A. Below the top of the table, yes.

16:36:58 23 Q. Okay. And as we discussed before from

16:36:59 24 Exhibit 14, the air is very turbulent underneath that

16:37:02 25 area; correct?

16:37:03 1 A. Yes.

16:37:03 2 Q. So particles are all over the place in that

16:37:07 3 area; correct?

16:37:07 4 A. Yes.

16:37:07 5 Q. We could agree that the concen -- the

16:37:09 6 bacterial load concentration is probably pretty

16:37:10 7 uniform underneath the operating room table due to the

16:37:13 8 turbulence; correct?

16:37:14 9 A. Under the table, yes.

16:37:15 10 Q. Okay. So it really doesn't matter if it's

16:37:18 11 on the floor, you know, on a stand or -- or on a pole

16:37:20 12 which is below the operating table, it's still drawing

16:37:24 13 from the same amount of bacterial load; correct?

16:37:26 14 A. But it's not under the operating table.

16:37:28 15 Q. It isn't?

16:37:29 16 A. The unit when it's -- when it's placed, no.

16:37:33 17 Q. Where is it placed?

16:37:33 18 A. It's placed behind the anesthetic screen.

16:37:37 19 Q. Behind the screen.

16:37:38 20 A. Yes.

16:37:38 21 Q. Well just --

16:37:39 22 And -- and the screen is not above the

16:37:40 23 operating room table?

16:37:41 24 A. The screen is above the table, yes.

16:37:43 25 Q. Okay. So it's placed -- and -- and when

282

16:37:46 1 you -- and who told you --

16:37:48 2 Where did you come up with this assumption?

16:37:50 3 Who told you that?

16:37:51 4 A. Well based on the photos I've -- I've seen

16:37:54 5 as how a typical Bair Hugger unit would be set up, and

16:37:57 6 the setup in the 3M lab.

16:37:58 7 Q. How long is the hose?

16:38:00 8 A. I'm guessing --

16:38:04 9 Well, I don't know the exact number.

16:38:09 10 Q. So it's your belief that the area where the

16:38:13 11 Bair Hugger is placed has the same bacterial load as

16:38:17 12 the areas coming out from the HVAC.

16:38:20 13 A. I did not say that.

16:38:21 14 Q. Okay. That's --

16:38:22 15 I just want to make sure. So what are you

16:38:25 16 saying?

16:38:25 17 A. I'm saying it's -- it's -- it could be

16:38:27 18 significantly different than what's under the table.

16:38:29 19 Q. Okay. But you agree it's still

16:38:31 20 significantly more than what's coming out of the HVAC

16:38:34 21 system.

16:38:34 22 A. It could be, depending on where the unit is

16:38:36 23 located.

16:38:36 24 Q. Well the hose is only so long.

16:38:39 25 A. But there could be airflow from the ceiling

283

16:38:42 1 coming over the table near the floor where the unit is
16:38:46 2 located, which would still be very clean air.

16:38:48 3 Q. But sitting here today, you don't know
16:38:50 4 either way; do you?

16:38:51 5 A. Say it again.

16:38:53 6 Q. Sitting here today, you don't know either
16:38:54 7 way what the bacterial load is, whether or not the
16:38:56 8 area where the Bair Hugger sits has air from the
16:38:59 9 ceiling clearing out the bacteria.

16:39:02 10 A. Not -- not without seeing actual
16:39:04 11 applications.

16:39:04 12 Q. Okay. Assuming that it is underneath the
16:39:08 13 operating room table --

16:39:10 14 Okay?

16:39:10 15 A. Okay.

16:39:11 16 Q. -- or an area where there is turbulence, and
16:39:14 17 the HVAC system can't clear out the bacterial load, --

16:39:20 18 A. Okay.

16:39:23 19 Q. -- would you agree with me that a MERV 14
16:39:31 20 filter -- strike that.

16:39:34 21 You agree with me that just because a
16:39:39 22 hospital operating room uses a MERV 14 filter, that is
16:39:43 23 a sufficient reason to use a MERV 14 filter in the
16:39:45 24 Bair Hugger?

16:39:47 25 A. I would say it's not a sufficient reason.

284

16:39:49 1 Q. Okay. And you agree with me that you have
16:40:02 2 been provided no data with respect to the bacterial
16:40:10 3 load underneath the operating room table.
16:40:12 4 A. I believe that's a correct statement.
16:40:14 5 Q. Okay. And to choose a filter, a reasonable
16:40:19 6 and prudent engineer should know the bioburden of the
16:40:24 7 air that the bacter -- that the Bair Hugger is drawing
16:40:27 8 from in selection of a filter; correct?
16:40:31 9 A. That would be prudent, yes.
16:40:32 10 Q. Okay. Do you have any reason to believe
16:40:36 11 that -- that 3M or Arizant considered that in
16:40:39 12 selecting the MERV 14 -- selecting their filter?
16:40:42 13 A. I cannot point to a document that says that,
16:40:46 14 no.
16:40:46 15 Q. Okay. Do you know what the efficiency is
16:40:59 16 for one to three microns of the Bair Hugger filter?
16:41:06 17 A. I have seen a test report where the filters
16:41:09 18 have been sent to an external test lab for -- for
16:41:13 19 measurements and --
16:41:13 20 Q. So what is it?
16:41:14 21 A. It's from -- from .3 to one.
16:41:17 22 Q. From one to three.
16:41:18 23 A. From one to three. I think it's in the
16:41:21 24 nineties.
16:41:21 25 Q. In the nineties. Okay.

16:41:28 1 And your opinion in this case is that's an
16:41:35 2 acceptable choice; correct?

16:41:36 3 A. Yes.

16:41:37 4 Q. Did you take into account in formulating
16:41:39 5 your opinions the -- the -- the bioburden of the air
16:41:43 6 that the Bair Hugger is drawing from?

16:41:46 7 A. Not specifically.

16:41:53 8 Q. What does that mean, "not specifically?"

16:41:55 9 A. I was looking at the most probable particle
16:41:59 10 size containing a -- a bacteria and how the filter
16:42:03 11 would -- would perform against that particle size.

16:42:06 12 Q. And what's that? What size?

16:42:09 13 A. Size between five and 10 microns.

16:42:12 14 Q. Okay. What's the efficiency for five to 10
16:42:17 15 microns?

16:42:17 16 A. The data I show, it's high nineties, close
16:42:20 17 to a hundred percent.

16:42:24 18 Q. Were you aware that they performed a test on
16:42:27 19 the filter --

16:42:28 20 You've read Winston Tan's report; correct?

16:42:30 21 A. That's what I'm referring to, yes.

16:42:32 22 Q. Okay. And actually, they ran initial tests
16:42:35 23 and the first -- first test results were not good
16:42:39 24 because of a manufacturing defect. Do you recall
16:42:41 25 that?

286

16:42:42 1 A. There were three batches that were tested,
16:42:44 2 and one of the batches, I -- I believe, did not meet
16:42:48 3 the requirements.
16:42:50 4 Q. Had a manufacturing defect; correct?
16:42:51 5 A. That -- that's what I read.
16:42:52 6 Q. Okay. And knowing where the --
16:43:01 7 Assuming that the Bair Hugger is drawing air
16:43:06 8 that has a large bioburden, did you take into account
16:43:14 9 whether the device had any leakage?
16:43:19 10 MR. GOSS: Object to the predicate.
16:43:23 11 A. I didn't --
16:43:24 12 Q. Do you know what I mean by "leakage?"
16:43:25 13 A. Yes.
16:43:26 14 Q. Okay.
16:43:26 15 A. Yes. Yes, I did.
16:43:28 16 Q. But you didn't test for leakage; correct?
16:43:38 17 A. I did no testing, no.
16:43:40 18 Q. And the Bair Hugger filter has a seal on it;
16:43:43 19 correct?
16:43:43 20 A. Which -- which Bair Hugger are you referring
16:43:47 21 to?
16:43:47 22 Q. The 750 or 775.
16:43:49 23 A. 775, yes.
16:43:50 24 Q. Did you -- did you check to see whether or
16:43:52 25 not, when the Bair Hugger is turned on, that it forms

16:43:55 1 a good seal so that no air could bypass the filter
16:43:59 2 through the sides?

16:44:00 3 A. It has what appeared to me to be a black
16:44:03 4 foam-rubber gasket, that when the filter is placed in
16:44:06 5 the bottom of the unit with the cover over it and the
16:44:09 6 bolts tightened down, that the gasket is compressed,
16:44:13 7 which indicates to me that there would be a good seal.

16:44:17 8 Q. But you don't know one way or the other;
16:44:18 9 correct?

16:44:18 10 A. I have not measured for leakage, no.

16:44:20 11 Q. Okay. By the way, you're aware that in
16:44:31 12 Elghabashi's study, that he assumed that the filter
16:44:36 13 stopped 100 percent of the particles?

16:44:37 14 A. I would have to go back and check that level
16:44:39 15 of detail. I don't recall at the moment.

16:44:41 16 Q. All right. Now you've done research on
16:44:53 17 actual bacterial growth that occurs within a filter;
16:44:57 18 correct?

16:44:57 19 A. That's correct.

16:44:57 20 Q. Okay. And as long as there are nutrients
16:45:02 21 provided to the bacteria, it actually could go -- grow
16:45:05 22 in the filter and -- and grow all the way through the
16:45:08 23 filter and then be released on the other side;
16:45:10 24 correct?

16:45:10 25 A. With appropriate environmental temperature

16:45:12 1 and humidity conditions, yes.

16:45:13 2 Q. Okay. What --

16:45:15 3 Do you know what the humidity is in -- in an

16:45:17 4 OR?

16:45:18 5 A. From what the design I have read, I think

16:45:21 6 it's supposed to be 50 percent.

16:45:22 7 Q. Okay. And that would be an ideal situation

16:45:24 8 for bacterial growth; correct?

16:45:26 9 A. I think --

16:45:27 10 Again, I'm not a microbiologist, but from

16:45:31 11 what I've heard from others, I think that's lower than

16:45:32 12 what's required to grow and propagate bacteria.

16:45:37 13 Q. Do you think --

16:45:38 14 What do you think the humidity should be?

16:45:40 15 A. I'm -- I'm thinking --

16:45:42 16 Q. If you know.

16:45:43 17 A. Again, I'm not a microbiologist. I don't

16:45:46 18 want to hazard a guess.

16:45:47 19 Q. Okay. And why does --

16:45:57 20 Why is humidity a factor?

16:46:01 21 A. Again, I'm not a microbiologist, but

16:46:04 22 humid --

16:46:06 23 Bacteria needs -- needs moisture to grow.

16:46:10 24 Q. What's a loaded filter?

16:46:35 25 A. The common term "loaded filter" typically

16:46:39 1 refers to a -- in -- in my area of expertise of
16:46:45 2 ventilation, an HVAC filter that has captured ambient
16:46:50 3 aerosol and dust over a fairly long period of time so
16:46:55 4 that it affects the filter performance both in
16:46:57 5 pressure drop and -- and capture efficiency.

16:46:59 6 Q. And what's a long period of time?

16:47:01 7 A. It really depends on the -- the loading. It
16:47:04 8 could be years if it's lightly loaded, it could be in
16:47:08 9 a matter of weeks or months.

16:47:09 10 Q. Okay. Do you agree that a filter with
16:47:18 11 sufficient dust loading will contain the nutrients
16:47:21 12 necessary to support mi -- microbial growth?

16:47:25 13 A. Our tests on a hundred percent outside air
16:47:29 14 confirmed that, provided the humidity was high enough.

16:47:33 15 Q. Well what's high enough?

16:47:35 16 A. We -- we did not --

16:47:37 17 We tested two media filters for one year,
16:47:40 18 hundred percent outside air. We did not find any
16:47:43 19 bacterial or fungal growth on those filters for the
16:47:47 20 whole year. We then put them in a test facility that
16:47:49 21 maintained 90 percent relative humidity, then we did
16:47:56 22 find growth.

16:47:56 23 Q. Okay. So you know 90 percent, growth, --

16:47:57 24 A. Yes.

16:47:58 25 Q. -- zero percent, no growth.

290

16:47:59 1 A. Well I didn't say zero percent. I said just
16:48:03 2 natural outdoor --
16:48:04 3 Q. Where were -- where were you?
16:48:05 4 A. It could range anywhere from in the
16:48:09 5 wintertime --
16:48:09 6 Well even in the summer, the early morning,
16:48:11 7 it could be close to 70, 80 percent, and then during
16:48:15 8 the hot afternoon it might drop down to 30 or 40.
16:48:16 9 Q. Okay. You agree with me that skin squames
16:48:38 10 would be good nutrients for bacteria; correct?
16:48:40 11 MR. GOSS: Objection, lack of foundation.
16:48:42 12 A. Again, I'm not a microbiologist. I would --
16:48:45 13 I would -- I -- I --
16:48:46 14 I don't want to answer that.
16:48:47 15 Q. Well you say here in one of your report --
16:48:49 16 your articles, "Atmospheric dust contains 30 to 40
16:48:52 17 percent organic matter by mass." Do you remember
16:48:55 18 that?
16:48:56 19 A. I think I remember that, yes.
16:48:57 20 Q. Would you consider skin -- skin squames
16:49:00 21 organic matter?
16:49:01 22 A. Yes. I think that was referring to outside
16:49:03 23 air in that case.
16:49:04 24 Q. I understand that, but I was talking about
16:49:07 25 skin squames. Do you consider that organic matter?

16:49:09 1 A. Skin squames is organic matter, I -- I agree
16:49:15 2 with that.

16:49:15 3 Q. Do you know --

16:49:15 4 Have you done any testing to see whether or
16:49:18 5 not bacteria could grow in the Bair Hugger over time
16:49:20 6 and come out the other end?

16:49:22 7 A. I have not done anything like that, no.

16:49:24 8 Q. Do you have any reason to believe that it
16:49:25 9 wouldn't occur in the Bair Hugger filter?

16:49:28 10 MR. GOSS: Object to form.

16:49:29 11 A. Again, we need two -- well, we need --

16:49:35 12 We need sufficient nutrients, number one --

16:49:37 13 Q. Which we know we have; correct?

16:49:39 14 MR. GOSS: Object to form.

16:49:40 15 A. -- which could be -- could be -- could be
16:49:41 16 the skin squames, but we also need the appropriate
16:49:44 17 humidity level, and with ORs controlled about 50
16:49:47 18 percent humidity, I think that's too low.

16:49:49 19 Q. Okay. But if some ORs are up to 70 percent
16:49:54 20 humidity, then there's potential for growth?

16:49:56 21 MR. GOSS: Calls for speculation.

16:49:57 22 A. I would speculate it has to be higher than
16:50:00 23 that.

16:50:00 24 Q. Okay. But you're speculating; correct?

16:50:03 25 A. Yes.

16:50:30 1 (Kuehn Exhibit 15 was marked
16:50:32 2 for identification.)
16:50:32 3 BY MR. ASSAAD:
16:50:44 4 Q. What's been marked as Exhibit 15 is an
16:50:46 5 article titled "Airborne Infection Control in Health
16:50:49 6 Care Facilities," authored by you; correct?
16:50:51 7 A. That's correct.
16:50:52 8 Q. And it's published in an August 2003 -- I
16:50:58 9 guess in the Journal of Solar Energy Engineering?
16:51:01 10 A. That's correct.
16:51:02 11 Q. Okay. Is that a publication put out by
16:51:06 12 ASME?
16:51:06 13 A. It is.
16:51:09 14 Q. I want you to turn to page 369 under
16:51:24 15 "Monitoring." Do you see that?
16:51:25 16 A. I see that.
16:51:26 17 Q. Okay. Do you recall writing this article?
16:51:30 18 A. I do.
16:51:31 19 Q. What was the purpose of writing this
16:51:33 20 article?
16:51:33 21 A. Professor Jane Davidson asked me for a
16:51:39 22 contributed article in one of these issues of the
16:51:41 23 Solar Energy Journal, so I -- I complied with her
16:51:44 24 request.
16:51:44 25 Q. Okay. And in "Monitoring" you're talking

293

16:51:48 1 about monitoring the -- the critical areas in a clean
16:51:54 2 room and as well as a healthcare facility; correct?
16:51:57 3 A. As I'm reading "Monitoring," it starts out
16:52:01 4 with pressure difference --
5 Q. But --
16:52:04 6 A. -- between clean zones.
16:52:05 7 Q. But this is "Airborne Infection Control in
16:52:08 8 Health Care Facilities;" correct?
16:52:10 9 A. Yes.
16:52:10 10 Q. So this is talking about monitoring in those
16:52:12 11 types of facilities; correct?
16:52:13 12 A. Yes.
16:52:13 13 Q. Okay.
16:52:14 14 A. Uh-huh.
16:52:14 15 Q. If you go to the last page -- or the last --
16:52:18 16 before the --
16:52:18 17 The next page, it says, "An alternative is
16:52:23 18 to use a continuous particle counter for the
16:52:26 19 measurement of total aerosol concentrations versus
16:52:29 20 time with periodic sampling of bioaerosols." Do you
16:52:33 21 agree with that statement?
16:52:34 22 A. Yes.
16:52:35 23 Q. And if you read two lines before that, it
16:52:43 24 talks about there could be elevated concentrations
16:52:47 25 that could occur as short-term bursts; correct?

294

16:52:51 1 A. Yes.

16:52:57 2 Q. So do you agree that you could use particle

16:52:59 3 counting to measure the total aerosol concentration in

16:53:06 4 an operating room?

16:53:08 5 A. Within the range of the instrument, yes.

16:53:11 6 Q. Okay. And if you used --

16:53:14 7 Most instruments, they could go from .3 to

16:53:16 8 10 microns; correct?

16:53:17 9 A. Optical particle counters can, yes. There

16:53:19 10 are other instruments that could go much lower and

16:53:21 11 much higher.

16:53:22 12 Q. But for the purposes of an operating room,

16:53:24 13 .3 to 10 microns would be appropriate; correct?

16:53:27 14 A. That's a reasonable particle-size range.

16:53:28 15 Q. You don't need nanometers at all.

16:53:31 16 A. Not -- not --

16:53:32 17 No.

16:53:32 18 Q. Yeah. Bacteria are -- are not that small;

16:53:43 19 correct?

16:53:43 20 THE REPORTER: Was there an answer?

16:53:46 21 MR. ASSAAD: I thought he said yes.

16:53:47 22 Q. But bacteria are not that small; correct?

16:53:49 23 A. Yes.

16:53:54 24 Q. When a Bair Hugger is turned on, how long do

16:54:59 25 you think it takes for equilibrium to reach?

16:55:06 1 A. How do you define "equilibrium?"

16:55:08 2 Q. Well, the Bair Hugger's turned on, the, you

16:55:14 3 know, Bair Hugger blanket's at room temperature, --

16:55:16 4 A. Yes.

16:55:18 5 Q. -- the blankets are at room temperature, the

16:55:19 6 drape is at room temperature, the table is at room

16:55:23 7 temperature. How long do you think it takes for the

16:55:25 8 Bair Hugger, when you turn it on, to actually heat up

16:55:30 9 itself to get to, you know, where it could eject air

16:55:36 10 at -- at 40 to 41 degrees Celsius and then warm up the

16:55:42 11 drapes around it and to get to like -- to equilibrium?

16:55:46 12 A. The only basis I can reply to that would be

16:55:49 13 the tests we did in the test room.

16:55:52 14 Q. And -- and --

16:55:53 15 A. And I --

16:55:55 16 Q. -- what's your answer? How long?

16:55:56 17 A. I recall the --

16:55:58 18 It took a matter of a few minutes before the

16:56:02 19 supply-air temperature was up -- up to design values,

16:56:07 20 and then I -- I don't know how long it would take for

16:56:09 21 the entire hose and the blanket to reach equilibrium.

16:56:13 22 Q. Now did you look at the temperature on the

16:56:17 23 Bair Hugger, of what the exit temperature is?

16:56:20 24 A. Not while I was doing my measurements, no.

16:56:23 25 Q. Do you know whether or not it was on high or

16:56:25 1 low or medium?

16:56:26 2 A. It was on high. We did --

16:56:30 3 Yes, it was on high.

16:56:31 4 Q. And the temperature that it comes out of the

16:56:33 5 blower, do you know if that temperature being measured

16:56:36 6 is out of the exit end -- end of the hose or at where

16:56:40 7 the blower -- where the air comes out of the blower

16:56:43 8 itself?

16:56:43 9 A. I don't recall that level of detail.

16:56:46 10 Q. Well you agree with me that that would be

16:56:52 11 important information to know, to know the actual air

16:56:55 12 entering into the Bair Hugger blanket, what

16:56:57 13 temperature it is; correct?

16:56:59 14 A. Yes.

16:56:59 15 Q. Okay. And -- strike that.

16:57:36 16 Doctor, assuming that when you did the

16:58:04 17 temperature in the testing with the Bair Hugger and

16:58:07 18 you saw an increase of five degrees Celsius over the

16:58:14 19 assumed surgical site, would that be significant?

16:58:19 20 A. Frankly, I was focusing on the velocity

16:58:21 21 measurements, not -- not the temperature measurements,

16:58:23 22 so those were -- that was considered to be secondary

16:58:26 23 measurements in the -- in the study we did. So I was

16:58:29 24 not paying much attention to those, I was paying more

16:58:32 25 attention to the velocity.

16:58:33 1 Q. Well you used your temperature measurements
16:58:36 2 to criticize Elghabashi.

16:58:39 3 A. I did.

16:58:41 4 Q. Okay. And to do your Archimedes
16:58:42 5 calculation; correct?

16:58:43 6 A. Yes.

16:58:43 7 Q. Okay. And to do your -- whether or not --
16:58:47 8 The adhesion forces with respect to
16:58:50 9 particles, you used temperature; correct? Used
16:58:53 10 temperature, those temperatures measurements you did
16:58:55 11 in those calculations; correct?

16:58:56 12 A. I don't recall using them in adhesion
16:59:00 13 calculations.

16:59:03 14 Q. You're right. Well -- no, you're right. My
16:59:06 15 fault.

16:59:09 16 If the temperature rose by five degrees over
16:59:13 17 the surgical site, would that be significant to you?

16:59:19 18 MR. GOSS: With the Bair Hugger on.

16:59:20 19 MR. ASSAAD: With the Bair Hugger on.

16:59:24 20 A. If that's the only thing that changed and
16:59:26 21 the airflow did not change at all, I would say
16:59:29 22 that's -- that's not significant.

16:59:30 23 Q. Well how would you think the heat increased?

16:59:37 24 A. Could be from the lights or from personnel.

16:59:41 25 Q. Lights are constant, personnel are constant.

16:59:44 1 Say the Bair Hugger turns on, that's the
16:59:46 2 only change, it goes up five degrees. Would that be
16:59:50 3 significant to you, having everything else constant?
16:59:52 4 A. If everything else is constant, that would
16:59:54 5 be the logical choice.
16:59:55 6 Q. Okay. Would that be significant with
16:59:57 7 respect to airflow disruption?
17:00:05 8 A. It -- it -- it possibly could be.
17:00:07 9 Q. Okay. Do you know who Professor Kurz is --
17:00:25 10 or Dr. Kurz?
17:00:27 11 A. I do not think I know him.
17:00:29 12 Q. I'll represent that she is on the advisory
17:00:34 13 panel for 3M. Have you seen any literature that she's
17:00:39 14 produced?
17:00:40 15 A. No.
17:00:44 16 Q. If the temperature around the surgical
17:01:00 17 table -- surgical site increased by five degrees when
17:01:03 18 the Bair Hugger was on, would you agree with me that
17:01:07 19 there's going to be a buoyancy force around the
17:01:10 20 surgical table?
17:01:13 21 A. There -- there's a buoyancy force anyway
17:01:15 22 because of the patient temperature and the wound
17:01:19 23 temperature, and that buoyant force is typically very
17:01:23 24 weak compared to the forced-air pressure force coming
17:01:27 25 down from the flow from the ceiling.

17:01:29 1 Q. So you have the flow coming down from the
17:01:31 2 ceiling at whatever, 59 degrees Celsius, correct, with
17:01:37 3 a certain velocity; correct?

17:01:37 4 A. Yes.

17:01:37 5 Q. But all of a sudden the Bair Hugger is on
17:01:39 6 and there's a five-degree increase in temperature over
17:01:42 7 the surgical site.

17:01:44 8 A. Yes.

17:01:44 9 Q. What's causing that heat to get up to
17:01:46 10 that -- to that area?

17:01:48 11 MR. GOSS: I'm going to object to 59 degrees
17:01:50 12 Celsius, counsel. It sounds a little hot.

17:01:53 13 MR. ASSAAD: Or 59 degrees Farenheit. I'm
17:01:55 14 sorry.

17:01:57 15 MR. GOSS: All right.

17:01:57 16 MR. ASSAAD: Thank you.

17:01:57 17 A. It sounds like it would be coming somewhere
17:01:58 18 from the Bair Hugger.

17:01:59 19 Q. So the heat would be com --

17:02:01 20 It would be from the waste heat of the Bair
17:02:02 21 Hugger; correct?

17:02:03 22 A. That sounds like a logical conclusion, yes.

17:02:08 23 Q. Okay. Let's go to Exhibit D of your report,
17:03:03 24 of Exhibit 1.

17:03:19 25 A. Okay.

300

17:03:20 1 Q. And that has to deal with the Archimedes
17:03:23 2 number; correct?

17:03:24 3 A. Yes.

17:03:25 4 Q. Have you ever calculated the Archimedes
17:03:28 5 number in the past 20 years?

17:03:31 6 A. Yes.

17:03:33 7 Q. For what purpose?

17:03:37 8 A. We were looking at the ventilation in hog
17:03:44 9 barns, the air coming in through the slot in one side
17:03:49 10 of the barn and then out through the fans on the other
17:03:53 11 side, exhausted on the other side.

17:03:55 12 Q. Okay. Now let's go through the equation.
17:03:57 13 You know the Archimedes number --
17:04:00 14 Which is dimensionless; correct?

17:04:02 15 A. Yes.

17:04:02 16 Q. -- equals the gravity, which is g.

17:04:04 17 A. Yes.

17:04:04 18 Q. And that's a constant; correct?

17:04:07 19 A. Yes.

17:04:07 20 Q. L, what's L?

17:04:08 21 A. It's a -- a length scale, which typically
17:04:11 22 this is applied to air jets, so it would be the -- say
17:04:14 23 the width from the diameter of that air jet.

17:04:16 24 Q. Okay. And you take one inch.

17:04:18 25 A. Yes, because I was based that -- basing that

17:04:22 1 on the measurements we made of the velocity leaving
17:04:25 2 the Bair Hugger blanket that we did.

17:04:27 3 Q. But where did you make the demens --

17:04:28 4 Where did you get a length scale of one

17:04:33 5 inch?

17:04:33 6 A. Well based on moving the probe around as the

17:04:37 7 flow is coming out the edge of the blanket, that

17:04:40 8 seemed to be the width of the jet roughly three inches

17:04:42 9 from the blanket edge.

17:04:44 10 Q. Three inches from the blanket edge?

17:04:47 11 A. Yes.

17:04:55 12 Q. So you're saying the jet was only one inch

17:05:00 13 wide?

17:05:00 14 A. Approximately, yes.

17:05:01 15 Q. That's all you measured coming out of the

17:05:03 16 blanket edge.

17:05:05 17 A. Well I was measuring the velocities and

17:05:07 18 the -- and the temperature there, and by measuring the

17:05:09 19 velocities I would move the probe up and down and try

17:05:14 20 to determine the width of the jet and where the

17:05:15 21 centerline was.

17:05:16 22 Q. Let's talk about engineering common sense

17:05:18 23 here. Okay? You have a blanket with over a thousand

17:05:22 24 holes blowing 43- to 45-cubic-feet-per-minute air. Do

17:05:26 25 you agree?

17:05:26 1 A. Yes.

17:05:27 2 Q. And you're saying that the length of the air

17:05:30 3 coming out of that area is only one inch?

17:05:32 4 A. That's the width of the air jet that I

17:05:35 5 measured coming out of the blanket.

17:05:36 6 Q. Okay. Is that the only place the air did

17:05:39 7 come out of the blanket?

17:05:40 8 A. No.

17:05:41 9 Q. Okay. Why didn't you use the length of

17:05:44 10 where all the air was coming out of the blanket?

17:05:48 11 A. You could think of the air coming out of the

17:05:50 12 blanket as -- as being with a certain height and a

17:05:55 13 certain length along the length of the blanket, so

17:05:57 14 it's the width of the jet, not the length of the jet

17:06:00 15 that's important.

17:06:01 16 Q. So the width as in --

17:06:04 17 A. Think of --

17:06:08 18 Q. -- an X axis?

17:06:04 19 A. Think of a slot. So air coming out of a

17:06:08 20 slot, which would be coming out the edge of the

17:06:11 21 blanket.

17:06:13 22 Q. What would -- is it the hydraulic width

17:06:16 23 or -- or --

17:06:18 24 Like what's the width of -- of the air

17:06:20 25 coming out of this slot here, this air, or

17:06:24 1 these -- or these slots over here, the air supply?

17:06:29 2 A. If one looked at an individual slot, it

17:06:31 3 would be about a half inch.

17:06:32 4 Q. A half inch?

17:06:33 5 A. Yeah, for -- for an individual slot.

17:06:36 6 Q. So you're looking at the width, not the

17:06:38 7 length.

17:06:38 8 A. Yes.

17:06:39 9 Q. Okay. And you're saying when you move the

17:06:45 10 temperature -- or the -- the measurement device, you

17:06:51 11 moved it up and down one inch; correct?

17:06:53 12 A. Moved it up and down sufficient to -- to map

17:06:56 13 out the approximate width of the jet to be about one

17:06:59 14 inch.

17:06:59 15 Q. And did --

17:07:00 16 How did you measure that?

17:07:01 17 A. Just by monitoring the velocities,

17:07:04 18 primarily, as I was moving the probe up and down.

17:07:08 19 Q. Okay. So you did it by looking at it by

17:07:09 20 eye. You didn't get a measurement you needed to

17:07:15 21 scale.

17:07:15 22 A. No. No.

17:07:16 23 Q. Okay. So -- so it's your -- it's your

17:07:18 24 testimony today that the width of the air coming out

17:07:22 25 of the Bair Hugger blanket three inches from the

17:07:25 1 blanket is only one inch.

17:07:27 2 A. Again, that was the representative

17:07:30 3 measurement I took to try to put a reasonable value

17:07:34 4 into this Archimedes equation.

17:07:37 5 Q. Okay. Have you looked at other areas of how

17:07:41 6 to calculate the length, what other people use in the

17:07:46 7 field?

17:07:46 8 MR. GOSS: The width or length?

17:07:47 9 MR. ASSAAD: The width, so L.

17:07:51 10 A. Typically, for a -- a slot, it -- it's

17:07:55 11 always the width.

17:07:56 12 Q. You do understand, when you're looking at

17:07:59 13 air jets, length is the distance of how far the air

17:08:07 14 pene -- jets out from the hole in a perpen -- like a

17:08:13 15 perpendicular -- if the hole is -- parallel to the

17:08:16 16 hole; correct?

17:08:17 17 A. Again, the Archimedes number is the ratio of

17:08:20 18 Reynolds number and Grashof number.

17:08:22 19 Q. I understand that. But when --

17:08:25 20 If you look at other studies, as you look at

17:08:27 21 act -- the Handbook of Fundamentals, Chapter 20, did

17:08:31 22 you actually go and look at it?

17:08:33 23 A. I don't believe I did. Well act --

17:08:35 24 actually, I may have done that to get this Archimedes

17:08:37 25 equation. I think I referenced that here.

305

17:08:39 1 Q. And did you look at what they -- when they
17:08:43 2 used L, what they were referring to?

17:08:48 3 A. I don't, again, recall that level of detail.

17:08:52 4 Q. Well that's kind of an important detail to
17:08:54 5 know what numbers to put into the equation; isn't it?

17:08:56 6 A. Again, this is a ratio of Reynolds number to
17:08:59 7 Grashof number where L is the same for both.

17:09:03 8 Q. Well L is very important when it comes to
17:09:06 9 calculating the numerator here; correct?

17:09:08 10 A. Yes.

17:09:09 11 Q. Because if L increases, your Archi -- your
17:09:10 12 Archimedes numbers increase; correct?

17:09:13 13 A. Yes.

17:09:13 14 Q. Okay. And if your delta T increases, your
17:09:16 15 Arch -- Archimedes number increases; correct?

17:09:19 16 A. Yes.

17:09:19 17 Q. Okay. These are important numbers; correct?

17:09:21 18 A. Yes.

17:09:21 19 Q. And ambient you used -- you used 70 degrees.

17:09:30 20 Why is that?

17:09:32 21 A. I was trying to estimate the value of the
17:09:34 22 Archimedes number and determine if it's near one, much
17:09:40 23 larger than one, or much less than one to determine if
17:09:43 24 the force convection or natural convection was
17:09:47 25 dominant, so I wasn't paying too much attention to the

17:09:49 1 absolute numbers here and the precision of the
17:09:51 2 numbers.

17:09:51 3 Q. So you're saying these numbers aren't
17:09:53 4 precise?

17:09:54 5 A. They're not very precise, they're -- they're
17:09:56 6 estimates.

17:09:56 7 Q. Okay.

17:09:57 8 A. Order -- order-of-magnitude estimates.

17:09:59 9 Q. Okay. So if length increases or the delta T
17:10:01 10 increases, you could actually get an Archimedes number
17:10:06 11 greater than one.

17:10:08 12 A. Yes.

17:10:34 13 THE REPORTER: Let's take a five, please.

17:10:36 14 Off the record.

17:21:09 15 (Recess taken.)

17:21:09 16 BY MR. ASSAAD:

17:21:12 17 Q. 2013 ASHRAE Handbook Fundamentals, Chapter
17:21:16 18 20, what is that titled?

17:21:19 19 A. I -- I don't remember offhand the exact
17:21:23 20 title.

17:21:23 21 Q. Is it titled "Space Air Diffusion?"

17:21:26 22 A. It sounds correct.

17:21:27 23 Q. Okay. And do you understand what a
17:21:33 24 hydraulic diameter is?

17:21:34 25 A. Yes.

17:21:35 1 Q. What's a hydraulic diameter?

17:21:37 2 A. It's the area divided by the perimeter.

17:21:43 3 Q. Okay. And -- and that's for a square;

17:21:49 4 correct? Or a rectangle.

17:21:51 5 A. For any -- any flow area.

17:21:53 6 Q. Okay. And would you agree that, according

17:21:55 7 to Chapter 20, that L should be -- is equal to the

17:22:02 8 length scale of the diffuser outlet equal to the

17:22:06 9 hydraulic diameter of the outlet?

17:22:07 10 A. I guess that seems reasonable.

17:22:12 11 Q. Okay. Is that --

17:22:13 12 Did you calculate the hydraulic diameter?

17:22:15 13 A. Not of the Bair Hugger blanket, no.

17:22:17 14 Q. Okay. So you agree with me if that's the

17:22:20 15 correct definition of what L should be, the number you

17:22:24 16 used is incorrect.

17:22:26 17 A. Again, I was just trying to get a rough

17:22:29 18 order-of-magnitude estimate of the ratio between the

17:22:31 19 buoyant force and the inertia force.

17:22:36 20 Q. That wasn't my question.

17:22:38 21 A. So if I have misread the definition of L,

17:22:45 22 then so be it.

17:22:46 23 Q. So these numbers are incorrect.

17:22:49 24 A. They could be not entirely accurate.

17:22:52 25 Q. Well if something --

17:22:53 1 I mean engineering is a profession of
17:22:56 2 accuracy when it comes to calculations; correct?
17:22:58 3 A. Yes.
17:23:00 4 Q. Okay. And if you used the wrong formula to
17:23:01 5 calculate -- or if you used the wrong definition of --
17:23:06 6 of length to calculate the Archimedes number, then the
17:23:09 7 Archimedes number is incorrect.
17:23:11 8 A. So the number I have here may be incorrect,
17:23:13 9 yes.
17:23:14 10 Q. Okay. And the delta T, that 75 degrees for
17:23:27 11 delta T is the difference between -- is -- is the
17:23:33 12 temperature you measured in Exhibit B; correct?
17:23:39 13 Seventy-five degrees.
17:23:39 14 A. Yes, it is.
17:23:41 15 Q. And let me ask you another question: Delta
17:23:44 16 T, according to your definition, is the temperature
17:23:46 17 difference between the jet and ambient; correct?
17:23:48 18 A. Yes.
17:23:48 19 Q. And then in the denominator you're supposed
17:23:54 20 to go temperature ambient times velocity square;
17:23:58 21 correct?
17:23:58 22 A. Yes.
17:23:59 23 Q. And you used two different temperatures for
17:24:01 24 ambient here; isn't that correct? One is 66, the
17:24:06 25 other is 70.

17:24:09 1 A. Yes. Because the temperature in the
17:24:12 2 denominator I took to be the -- the mean of the two,
17:24:15 3 the -- the jet temperature of 75 and the room
17:24:17 4 temperature of 66.

17:24:18 5 Q. Well isn't the room temperature the ambient
17:24:21 6 temperature?

17:24:21 7 A. I guess one -- one -- one could use that
17:24:25 8 definition, yes.

17:24:26 9 Q. Well --

17:24:27 10 A. It's --

17:24:28 11 Q. -- it's your definition here, doctor.

17:24:30 12 A. Yes.

17:24:30 13 Q. T ambient is the mean absolute temperature
17:24:33 14 of the jet and its surroundings.

17:24:35 15 A. Yes.

17:24:35 16 Q. Okay. And how did you calculate 70?

17:24:39 17 A. Seventy was -- was an estimate, as I said,
17:24:43 18 between the 75 we measured and the 66 we measured.

17:24:46 19 Q. Okay. And -- and the 460 is just to make it
17:24:51 20 absolute; correct?

17:24:52 21 A. That's correct.

17:24:56 22 Q. So if you would --

17:24:57 23 Would you agree with me that the hydraulic
17:25:00 24 diameter of the Bair Hugger blanket is much larger
17:25:02 25 than one inch? Correct?

17:25:05 1 A. For --

17:25:05 2 MR. GOSS: Object to form.

17:25:06 3 A. For the blanket, yes.

17:25:07 4 Q. Okay.

17:25:09 5 A. For the entire blanket.

17:25:10 6 Q. Okay. So you would agree with me that if

17:25:15 7 you actually used the hydraulic temperature of the

17:25:18 8 blanket, that that would significantly increase the

17:25:23 9 Archimedes number.

17:25:26 10 A. Say that again.

17:25:26 11 Q. If you used the actual hydraulic temper --

17:25:30 12 hydraulic diameter of the blanket, that would

17:25:34 13 significantly increase the Archimedes number; correct?

17:25:37 14 A. It would change it from the value of one

17:25:39 15 inch I used to perhaps 10, 15 inches.

17:25:44 16 Q. Ten, 15 inches.

17:25:46 17 What's the dimension of the Bair Hugger

17:25:47 18 blanket?

17:25:47 19 A. I'm -- I'm talking about an edge -- one of

17:25:50 20 the edges of the blanket since the air is blowing

17:25:52 21 different directions on different edges.

17:25:54 22 Q. Well you can't use an edge because you're

17:25:56 23 looking at area divided by perimeter; correct? An

17:26:00 24 edge doesn't have an area.

17:26:01 25 A. But the air is coming out between the --

17:26:04 1 what I'll call the blanket over the Bair Hugger
17:26:07 2 blanket and the Bair Hugger blanket itself along an
17:26:10 3 edge someplace.

17:26:14 4 Q. You don't know what the Arch --
17:26:16 5 You don't know what the length is; do you?
17:26:20 6 You're just using a number.

17:26:21 7 A. I can estimate it based on the dimensions of
17:26:23 8 the blanket.

17:26:23 9 Q. What are the dimensions of the blanket?

17:26:26 10 A. I -- I could hazard a guess. I don't know
17:26:28 11 the exact numbers.

17:26:29 12 Q. Okay. So sitting here today, you agree with
17:26:35 13 me that based on the definition provided by the ASHRAE
17:26:38 14 Handbook of Fundamentals as to what length is supposed
17:26:40 15 to be, that the numbers that you have given for the
17:26:44 16 Archimedes number is incorrect.

17:26:47 17 A. That appears to be the case.

17:26:55 18 Q. Let's go to Exhibit C of your report.
17:27:13 19 Exhibit C is titled "Calculation of potential particle
17:27:16 20 removal between the bottom of the Bair Hugger and the
17:27:19 21 floor which would also be the case when the Bair
17:27:22 22 Hugger is sitting on a cart with a flat top." Did I
17:27:24 23 read that correctly?

17:27:25 24 A. That's correct.

17:27:25 25 Q. And you are calculating the forces needed to

312

17:27:38 1 basically move a particle that's on a floor; correct?

17:27:43 2 A. On a flat surface, yes.

17:27:45 3 Q. On a flat surface. Okay.

17:27:47 4 Do you know whether or not Corn and Stein

17:27:50 5 were looking at -- strike that.

17:28:05 6 Did you actually read the article that was

17:28:16 7 authored by Corn and Stein in 1965?

17:28:19 8 A. I don't believe I did, no.

17:28:20 9 Q. You just looked at the diagram; didn't you?

17:28:22 10 A. In the textbook by Hinds, yes.

17:28:24 11 Q. Okay. And they're talking about what force

17:28:30 12 would be required to begin to basically move a

17:28:34 13 particle on a flat surface; correct?

17:28:35 14 A. Yes.

17:28:36 15 Q. And the forces is --

17:28:40 16 Do you know what the direction of the force

17:28:41 17 was?

17:28:43 18 A. Force would have to be horizontal to the

17:28:46 19 surface.

17:28:47 20 Q. Okay. So parallel with the surface;

17:28:49 21 correct?

17:28:49 22 A. Yes.

17:28:49 23 Q. Okay. So that's not this case here; is it?

17:28:53 24 There's a vertical component of that force; correct?

17:28:55 25 A. Could you clarify "vertical component?"

17:29:03 1 Q. Well, you have a particle on -- on the
17:29:06 2 surface; correct?

17:29:06 3 A. Yes.

17:29:07 4 Q. And you have a velocity of air going against
17:29:11 5 gravity up; correct? So there's a force, a suction
17:29:17 6 force on the particle; correct?

17:29:19 7 A. I think it's strictly a -- a shear-force
17:29:22 8 issue where the flow is blowing parallel to the
17:29:25 9 surface the particle is attached to.

17:29:29 10 Q. So you don't think that the upward force has
17:29:32 11 any effect on whether or not a particle is going to
17:29:35 12 move with a certain amount of force?

17:29:37 13 A. I --

17:29:38 14 My understanding of this data, it's based on
17:29:40 15 a horizontal --

17:29:41 16 Q. I understand -- I understand that.

17:29:44 17 A. Uh-huh.

17:29:44 18 Q. But we're not just looking at a horizontal
17:29:47 19 force with the -- with the effect of a Bair Hugger
17:29:49 20 sucking in air from the floor; correct?

17:29:51 21 A. If we're looking at particles attached to a
17:29:54 22 horizontal surface, there is no vertical velocity at
17:29:57 23 the surface.

17:29:58 24 Q. Of the particle; correct?

17:29:59 25 A. And the surface.

314

17:30:00 1 Q. And the surface. But there's a -- there's
17:30:02 2 a -- there's a force -- there's a force that's -- that
17:30:13 3 the Bair Hugger is exerting on the particles, which is
17:30:15 4 an upward force from suction.

17:30:18 5 A. If you're talking about a particle attached
17:30:21 6 to a surface, --

17:30:21 7 Q. Yes.

17:30:22 8 A. -- I -- I disagree with that.

17:30:25 9 Q. Okay. So you're saying all the -- when --
17:30:29 10 when a --

17:30:30 11 When a Bair Hugger is turned on and it's on
17:30:31 12 the floor and it's -- it is .626 inches above the
17:30:43 13 floor, that the force it exerts on the particle is
17:30:45 14 only horizontal?

17:30:46 15 A. I'm looking at the most likely scenario to
17:30:50 16 dislodge particles attached to the surface.

17:30:53 17 Q. Now what was the point of you performing
17:30:56 18 this calculation?

17:30:56 19 A. I was responding to -- I believe it was
17:31:04 20 Koenigstofer's report.

17:31:07 21 Q. What part of his report?

17:31:09 22 A. Re -- report where he said --

17:31:13 23 If I could go back to my report here. On
17:31:33 24 page nine of Exhibit 1 there's items two and three.
17:31:45 25 "The Bair Hugger draws particles off the floor into

315

17:31:48 1 the unit. It functions much like a household vacuum
17:31:52 2 cleaner," and number three, "The air velocity at the
17:31:53 3 floor under the Bair Hugger is sufficient to entrain
17:31:55 4 particles from the floor."

17:31:57 5 Q. Okay. But with respect to Dr. Elghabashi's
17:32:01 6 report, this -- this Exhibit C has nothing to do with
17:32:04 7 his report; correct?

17:32:05 8 A. He's not assuming particles are attached to
17:32:08 9 the floor. They're in a volume.

17:32:12 10 Q. So you agree with me that Exhibit C, the
17:32:16 11 calculations in this report, has nothing to do with
17:32:18 12 Dr. Elghabashi's report; correct?

17:32:21 13 A. That's correct.

17:32:23 14 Q. And it seems here that you calculated the
17:32:35 15 area for a cylinder; correct? The outside area of the
17:32:40 16 cylinder, not the --

17:32:42 17 A. For a sphere.

17:32:43 18 Q. Huh? For a sphere?

17:32:45 19 A. Yes.

17:32:47 20 Where -- where are you looking at?

17:32:48 21 Q. Part of Exhibit C. Under A.

17:33:02 22 A. Oh, under A.

17:33:03 23 Q. PiDH.

17:33:05 24 A. Yes, that -- that's the -- the cylindrical
17:33:09 25 passage between the edge of the filter and the bottom

17:33:13 1 of the -- I think it was a 505 Bair Hugger model and
17:33:17 2 the edge of the case. That was the --
17:33:22 3 Q. And -- and PiDH is the calculation -- the
17:33:25 4 calculation of the area of a sphere -- or of a -- of a
17:33:29 5 cylinder; correct?
17:33:29 6 A. Yes.
17:33:29 7 Q. Okay. Not a sphere.
17:33:31 8 A. Yes.
17:33:32 9 Q. Okay. And for the velocity of 27 CFM, where
17:33:40 10 did you get that number from?
17:33:41 11 A. I believe that was provided by counsel.
17:33:45 12 Q. They actually gave you 27 CFM for the 505?
17:33:50 13 A. I believe that was correct.
17:33:51 14 Q. And so you relied upon that number; correct?
17:33:53 15 A. Yes.
17:33:54 16 Q. Is there any document they provided to you
17:33:56 17 to give you that number?
17:33:57 18 A. There -- there may have been. I -- I cannot
17:34:01 19 recall.
17:34:01 20 Q. In Exhibit E, what were you look -- what
17:34:07 21 document in here did you use to rely on that 27 CFM?
17:34:12 22 A. Exhibit D?
17:34:13 23 Q. E.
17:34:13 24 A. Oh, E.
17:34:14 25 Q. Under "Materials Considered."

17:34:28 1 A. I don't -- I don't think it was a document,

17:34:30 2 it was probably discussion with -- with counsel.

17:34:32 3 Q. So when I asked you are there any facts that

17:34:35 4 you relied upon from counsel and you told me "no"

17:34:38 5 earlier in this deposition, that wasn't correct.

17:34:40 6 A. Apparently you -- you found one that was not

17:34:42 7 in my list.

17:34:43 8 Q. Any other facts or -- or information that is

17:34:47 9 in your report that you obtained from counsel and you

17:34:51 10 rely upon?

17:34:52 11 A. Not that I can think of offhand.

17:34:54 12 Q. And with respect to Fig. 6.4 of Exhibit C,

17:34:58 13 do you know what type of floor or -- or the surface

17:35:01 14 that the glass beads were on?

17:35:06 15 A. Fig. 6.4, those are smooth surfaces.

17:35:09 16 Q. Okay. Do you know what the surface is like

17:35:11 17 in an operating room?

17:35:12 18 A. It's, I would assume, not as smooth as the

17:35:17 19 surface as used for these measurements.

17:35:18 20 Q. And that would change --

17:35:20 21 And -- and when the surface is not smooth,

17:35:22 22 the adhesion force is less; correct?

17:35:24 23 A. It's more.

17:35:25 24 Q. More?

17:35:25 25 A. Yes. Because there's more contact areas

17:35:28 1 between the particles and the surface.

17:35:30 2 Q. When it's smooth or not smooth?

17:35:34 3 A. When it's not smooth.

17:35:36 4 Q. More contact --

17:35:36 5 A. Yes.

17:35:37 6 Q. -- with the sphere and the surface?

17:35:39 7 A. Yes, because of the irregularities in the

17:35:42 8 surface.

17:35:43 9 Q. You have facilities at the University of

17:36:47 10 Minnesota to test the Bair Hugger filtration; correct?

17:36:49 11 A. There probably are. But as I said, I'm a

17:36:53 12 retired faculty member and do not really have access

17:36:56 13 to that.

17:36:57 14 Q. Okay. But you have colleagues that have

17:37:01 15 access to it; correct?

17:37:03 16 A. Yes.

17:37:04 17 Q. Did you ask any of them to -- to do an

17:37:07 18 efficiency testing on the filter?

17:37:08 19 A. No, I have not.

17:37:12 20 Q. And you have a clean room in the University

17:37:26 21 of Minnesota?

17:37:26 22 A. Actually, two.

17:37:28 23 Q. Two.

17:37:28 24 A. Yes. One in the Electrical Engineering

17:37:31 25 Building that was built in the, I think, mid-'80s, and

17:37:34 1 there's a newer one in the -- it's actually a new
17:37:37 2 physics building.

17:37:41 3 Q. And they're both still working?

17:37:43 4 A. As far as I know, yes.

17:37:45 5 Q. And you've used before neutrally buoyant
17:38:05 6 helium bubbles in your -- in your testing; correct?

17:38:08 7 A. I have, yes.

17:38:09 8 Q. And that's a -- a reasonable methodology to
17:38:13 9 follow an airflow; correct?

17:38:14 10 A. For low-velocity airflows, yes, in -- in
17:38:20 11 room environments.

17:38:20 12 Q. In a what?

17:38:20 13 A. In room environments.

17:38:20 14 Q. Such as an operating room?

17:38:21 15 A. I would think so, yes.

17:38:23 16 Q. Okay. Do you know whether or not the Bair
17:38:36 17 Hugger filters have binders in them, uses binders?

17:38:39 18 A. I do not know for certain, but I would
17:38:41 19 assume they did.

17:38:43 20 Q. But you would be guessing.

17:38:44 21 A. I would be guessing.

17:38:48 22 Q. Go to page four of your report. And -- and
17:39:01 23 with respect to the filter testing, do you know if 3M
17:39:03 24 has asked anyone at the University of Minnesota to do
17:39:08 25 any filter efficiency tests?

320

17:39:11 1 A. Regarding the Bair Hugger?

17:39:12 2 Q. Yes.

17:39:13 3 A. Not that I'm aware of.

17:39:16 4 Q. So looking at the diagram of impaction, it

17:39:21 5 states, "Impaction occurs when the momentum of a large

17:39:24 6 particle causes it to deviate from a streamline and

17:39:26 7 collide with a filter fiber..." Did I read that

17:39:29 8 correctly?

17:39:29 9 A. Yes.

17:39:29 10 Q. Okay. We talked about this earlier;

17:39:31 11 correct?

17:39:31 12 A. Yes.

17:39:32 13 Q. Okay. So looking at this picture here,

17:39:35 14 that -- would you consider that deviation of a

17:39:37 15 streamline significant?

17:39:38 16 A. Yes.

17:39:40 17 Q. Okay.

17:39:40 18 A. Uh-huh.

17:39:50 19 Q. Then if you go to page five, do you agree

17:40:00 20 that, based on page five, any particle size greater

17:40:03 21 than one micron, that its primary source of filtration

17:40:08 22 is impaction?

17:40:10 23 A. I think that's -- as --

17:40:13 24 As the figure indicates here, that would be

17:40:14 25 correct.

17:40:14 1 Q. Okay. Would that indicate that particles
17:40:25 2 over one micron rarely follow air streams unless the
17:40:29 3 air stream is not changing?

17:40:32 4 A. Well with -- within the filtration media,
17:40:35 5 they do not follow the streamlines.

17:40:39 6 Q. And that would --
17:40:41 7 I mean if they don't follow the streamlines,
17:40:44 8 then the filtration media --
17:40:45 9 If there's a change in the streamline in the
17:40:47 10 regular environment, inertia is going to cause it to
17:40:50 11 deviate from the streamline; correct?
17:40:51 12 A. As I said before, it depends on the
17:40:53 13 magnitude of the acceleration perpendicular to the
17:40:57 14 direction of flow.
17:40:58 15 Q. And as well as how intense the turbulence
17:41:02 16 is; correct?
17:41:03 17 A. Yes.
17:41:10 18 Q. Do you think it's possible to use a HEPA
17:41:27 19 filter in the Bair Hugger 775?
17:41:31 20 A. I would say yes, it's possible.
17:41:33 21 Q. But sitting here today you don't think it's
17:41:40 22 necessary.
17:41:41 23 A. I do not, no.
17:41:50 24 (Discussion off the stenographic record.)
17:41:57 25 Q. But since the Mistral and WarmAir uses a

322

17:42:02 1 HEPA filter, there should be no reason from an
17:42:05 2 engineering standpoint that a HEPA filter cannot be
17:42:07 3 used in the Bair Hugger; correct?
17:42:08 4 MR. GOSS: Objection to form.
17:42:09 5 A. There are a lot of other variables to
17:42:12 6 consider; you know, the flow rate, the motor size,
17:42:15 7 leakage issues. There would have to be some redesign.
17:42:18 8 Q. Of course you have to change the motor. You
17:42:20 9 need a more powerful motor; correct?
17:42:23 10 A. Yes.
17:42:27 11 Q. You write on paragraph nine -- or page nine,
17:42:47 12 the first paragraph, "The Bair Hugger's incorporation
17:42:49 13 of a MERV 14 filter -- the same minimum filtration
17:42:53 14 level that ASHRAE recommends for air supplied to
17:42:55 15 operating rooms -- provides additional protection from
17:42:59 16 airborne bacteria for patients undergoing surgery."
17:43:03 17 What basis do you have that the filter
17:43:06 18 that's used in the Bair Hugger provides additional
17:43:08 19 protection from airborne bacteria for patients
17:43:11 20 undergoing surgery?
17:43:12 21 A. So I was referring to the filter in the
17:43:17 22 incoming air into the operating room itself being
17:43:20 23 filtered, as we've talked about, twice, the prefilter
17:43:25 24 and -- and the final filter, and then that air going
17:43:28 25 through a third filter, really, through -- through the

17:43:30 1 Bair Hugger.

17:43:32 2 Q. And you don't think that air picks up any

17:43:34 3 bacteria or -- or -- or particles between the HVAC

17:43:39 4 system as it goes over the patient and the surgical

17:43:42 5 staff?

17:43:44 6 A. It certainly could and probably does.

17:43:45 7 Q. You -- you really have no basis for that

17:43:47 8 statement; isn't that correct?

17:43:48 9 MR. GOSS: Objection, form, argumentative.

17:43:49 10 Q. It's pure speculation; correct?

17:43:51 11 MR. GOSS: Object to form.

17:43:58 12 A. Again, I was referring to the secondary --

17:44:00 13 the filtration after the filter -- filtered air

17:44:05 14 entering the room.

17:44:05 15 Q. So you have a fil -- air coming out after

17:44:08 16 it's been filtered twice, and it picks up a lot of

17:44:11 17 junk by the time it gets to the floor, and the Bair

17:44:15 18 Hugger filters that, you consider that additional

17:44:17 19 filtration?

17:44:17 20 A. Yes.

17:44:18 21 Q. Okay.

17:44:18 22 A. Uh-huh.

17:44:19 23 Q. Okay. Additional protection?

17:44:20 24 A. It's removing particles from the air, yes.

17:44:23 25 Q. Well why do you consider it to have

324

17:44:26 1 additional protection from the airborne bacteria for
17:44:30 2 patients undergoing surgery? What's additional?

17:44:33 3 A. It -- it's -- it's an additional removal
17:44:35 4 mechanism of particles in the OR.

17:44:38 5 Q. Why were you concerned about the particles
17:44:41 6 on the floor or below the operating room table?

17:44:43 7 A. Again, they -- they could be transported to
17:44:46 8 the surgical site for some reason.

17:44:48 9 Q. Such as use of the Bair Hugger?

17:44:51 10 MR. GOSS: Object to form.

17:44:52 11 Q. Maybe; correct?

17:44:53 12 A. Well, possibly.

17:44:55 13 MR. GOSS: Calls for speculation.

17:46:02 14 Q. Are you aware that --
17:46:04 15 You've read Michael Buck's report; correct?

17:46:06 16 A. Yes.

17:46:06 17 Q. And he conducted some of those tests in the
17:46:08 18 clean room at the University of Minnesota. Are you
17:46:10 19 aware of that?

17:46:11 20 A. Yes.

17:46:11 21 Q. Have you ever used that clean room?

17:46:14 22 A. I have, actually. I -- I think so.

17:46:15 23 Q. Okay. The small one, it's like on the
17:46:18 24 bottom floor of a building.

17:46:19 25 A. Yeah, the basement floor of the Boynton

325

17:46:24 1 Health Service Building.

17:46:25 2 Q. Okay. When was the last time you used that?

17:46:27 3 A. Probably early '90s.

17:46:30 4 Q. Okay. Do you disagree with his report that

17:46:41 5 when the Bair Hugger was turned on, that there was an

17:46:44 6 increase in particles found in the clean room

17:46:47 7 irregardless of size?

17:46:49 8 A. I would have to look at his report.

17:46:52 9 Q. Well you've criticized his report, so do you

17:46:57 10 have the report with you today?

17:46:58 11 A. I did not bring it, no.

17:47:00 12 Q. Okay.

17:47:04 13 A. By the way, I -- I was not provided the

17:47:10 14 tableted results until Friday. All I was able to

17:47:12 15 comment on was his plots up to -- up to Friday.

17:47:16 16 Q. So on Friday you also received his -- his --

17:47:20 17 his results, his numerical results; correct?

17:47:22 18 A. Yes. Yes.

17:47:23 19 Q. Do you agree, based on what you've seen on

17:47:25 20 Friday, that there was an increase in particles when

17:47:28 21 the Bair Hugger was turned on?

17:47:29 22 A. Again, I'd have to go back and look at

17:47:31 23 the -- look at the data.

17:47:32 24 Q. Okay. Do you know who Andy Streifel is?

17:47:37 25 A. I do.

17:47:40 1 Q. We talked about that before; right?

17:47:40 2 A. Yes.

17:47:40 3 Q. Do you know what he does for a living?

17:47:42 4 A. He's basically a hospital infection-control

17:47:45 5 specialist.

17:47:46 6 Q. Environmentalist; correct?

17:47:47 7 A. Yes.

17:47:48 8 Q. Okay. And he goes around testing air

17:47:51 9 quality in hospital rooms; correct?

17:47:52 10 A. Yes.

17:47:53 11 Q. Do you agree he's an expert in that field?

17:47:55 12 A. Yes.

17:48:04 13 Q. Have you read an article authored by Ativan?

17:48:08 14 A. I --

17:48:09 15 MR. GOSS: Avidan?

17:48:10 16 MR. ASSAAD: Avidan, yes.

17:48:12 17 A. I do not recall that I have.

17:48:15 18 Q. Do you believe a filter is required on the

17:48:41 19 Bair Hugger device?

17:48:43 20 MR. GOSS: Objection, vague.

17:48:47 21 A. I would -- I would say it certainly makes

17:48:50 22 intuitive sense to include a filter, yeah.

17:48:53 23 Q. Why?

17:48:56 24 A. Several reasons. You want to --

17:48:58 25 Q. Well for -- forget about --

17:48:59 1 I'm talking with respect to patient safety.

17:49:01 2 I understand that every motor needs a filter in front

17:49:04 3 of it so you don't destroy the motor, like most cars

17:49:08 4 do and everything like that.

17:49:09 5 A. Right.

17:49:10 6 Q. Okay. Forget the reasons for protection of

17:49:12 7 the device. Do you believe that it needs a filter to

17:49:15 8 protect contamination of the operating room?

17:49:19 9 A. It would certainly help protect the -- or

17:49:24 10 ensure the air leaving the blanket is -- is -- has

17:49:30 11 lower concentrations than if the filter was not there.

17:49:34 12 Q. Do you believe that the blanket can

17:49:36 13 prevent --

17:49:40 14 Is there anything within the blanket that

17:49:42 15 protects bacteria from coming out of the -- the

17:49:45 16 perforations?

17:49:47 17 A. Because the blanket is made of a

17:49:50 18 non-metallic -- I'm not sure the exact material, and

17:49:54 19 there's a large surface area within the blanket, I

17:49:57 20 would think there would be some -- some deposits

17:49:59 21 within the blanket itself before the particle leaves

17:50:02 22 the holes, yes.

17:50:03 23 Q. Okay. But some particles will leave the

17:50:05 24 holes.

17:50:06 25 A. Some particles will leave the holes, yes.

17:50:08 1 Q. And some of that will contain bacteria;

17:50:10 2 correct?

17:50:10 3 A. Most likely, yes.

17:50:11 4 Q. Okay.

17:50:12 5 A. Uh-huh.

17:50:48 6 MR. ASSAAD: At this time, doctor, I have no

17:50:49 7 more questions. I think your counsel might have some

17:50:52 8 questions.

17:50:54 9 Thank you.

17:50:55 10 THE WITNESS: You're welcome.

17:50:57 11 MR. ASSAAD: Oh. Before I forget, I'm going

17:51:00 12 to leave this deposition open based on his notes, his

17:51:04 13 30-page notes we may receive, as well as the photos

17:51:07 14 that -- we requested some of the photos he's also

17:51:11 15 received from you.

17:51:12 16 MR. GOSS: All right. I have a few

17:51:13 17 questions.

17:51:15 18 THE REPORTER: Let's go off the record a

17:51:17 19 moment, please.

20 (Discussion off the record.)

17:54:46 21 REDIRECT EXAMINATION

17:54:48 22 BY MR. GOSS:

17:54:49 23 Q. Dr. Kuehn, you were asked questions about

17:54:52 24 notes that you had in connection with your work on

17:54:56 25 this case. Do you recall that testimony?

329

17:55:00 1 A. Yes, I do.

17:55:05 2 (Discussion off the stenographic record.)

17:55:06 3 Q. All right. And those notes included some of

17:55:13 4 the calculations that are reflected in your report;

17:55:15 5 correct?

17:55:15 6 A. Yes. They were the preliminary calculations

17:55:18 7 I did that ended up in the report.

17:55:19 8 Q. Okay. And those notes also included notes

17:55:22 9 on conversations that you had with me; correct?

17:55:25 10 A. Yes.

17:55:25 11 Q. All right. Is there anything substantive in

17:55:30 12 those notes, setting aside the notes on conversations

17:55:35 13 you had with me, is there any -- any substance in

17:55:38 14 those notes that -- different from or in addition to

17:55:41 15 what ended up in your report?

17:55:43 16 A. Nothing substantive, no.

17:55:46 17 Q. Okay. If you would turn to your report,

17:55:51 18 please, Exhibit 1, and in particular let's look at

17:56:02 19 Exhibit B, which is the document -- or it's the

17:56:10 20 exhibit entitled "3M Lab Measurements," and I believe

17:56:19 21 you testified earlier that -- that it was your idea to

17:56:23 22 take some measurements of temperature and velocity

17:56:28 23 coming from the -- from a setup Bair Hugger; is that

17:56:32 24 right?

17:56:32 25 A. That's correct.

17:56:32 1 Q. All right. Why did you want to do that?

17:56:34 2 A. I wanted to have first-hand experience

17:56:37 3 rather than relying on second- or third-hand

17:56:40 4 information.

17:56:41 5 Q. Okay. And what --

17:56:42 6 Why did you want the information? What was

17:56:45 7 it about the information that was pertinent to your

17:56:49 8 work in the formulation of your opinions?

17:56:51 9 A. It was primarily the velocity both leaving

17:56:54 10 the Bair Hugger blanket and near the filter or the

17:56:58 11 intake of the Bair Hugger to address the issues of

17:57:01 12 particle dislodgement and -- and the -- where the air

17:57:05 13 would go once leaving the blanket.

17:57:07 14 Q. Okay. And if you'll look at that first page

17:57:15 15 of the exhibit, these are the measurements that were

17:57:18 16 taken three inches from the blanket edge where the

17:57:24 17 picture is shown; is that right?

17:57:25 18 A. That's correct.

17:57:26 19 Q. All right. And if you compare from a

17:57:34 20 velocity standpoint the numbers for that measurement

17:57:41 21 to the -- the numbers taken in other places, can you

17:57:49 22 comment on any differences there in terms of the

17:57:53 23 velocity?

17:57:55 24 MR. ASSAAD: Objection, vague.

17:57:57 25 Q. I guess what I would ask you is: What does

17:58:02 1 the -- the first page of the exhibit show you in terms
17:58:06 2 of the velocity relative to velocity measurements
17:58:09 3 elsewhere around --
17:58:11 4 MR. ASSAAD: Objection, vague.
17:58:13 5 Q. -- elsewhere around the setup that's
17:58:16 6 depicted here?
17:58:17 7 MR. ASSAAD: Objection, vague and leading.
17:58:20 8 A. I was looking at the -- the --
17:58:24 9 The question arose as what impact the
17:58:27 10 velocity would have leaving the Bair Hugger blanket on
17:58:31 11 the surgical site, air movement through the surgical
17:58:35 12 site, so I was looking at velocities leaving the
17:58:38 13 blanket, as best as I can measure with the setup
17:58:41 14 provided, and determine that these -- these velocities
17:58:47 15 were -- near the blanket were -- were quite high, but
17:58:51 16 then they diminished rapidly as the air mixed with air
17:58:54 17 in the room.
17:58:54 18 Q. Okay. You testified earlier about your
17:59:00 19 efforts to measure the width of the jet from the Bair
17:59:06 20 Hugger blanket. Do you recall that testimony?
17:59:07 21 A. Yes.
17:59:08 22 Q. All right. Does this picture on the first
17:59:14 23 page of -- of Appendix B, is -- is this where you were
17:59:22 24 placing the probe to try to measure the jet?
17:59:26 25 A. Yes, it was.

17:59:27 1 Q. Okay. And you'll see the temperature

17:59:32 2 measurements here begin with the Bair Hugger off, and

17:59:36 3 it's 66.2 degrees; correct?

17:59:38 4 A. Yes.

17:59:40 5 Q. All right. And then what happens to the

17:59:44 6 temperatures subsequently?

17:59:46 7 A. The temperatures tend -- tended to rise.

17:59:49 8 And I should probably point out that the

17:59:51 9 order of data shown in the table does not necessarily

17:59:55 10 represent the order the data was taken in the -- in

17:59:58 11 the facility.

18:00:00 12 Q. Okay. So the -- the -- the measurements or

18:00:04 13 the -- the part of the table that counsel was asking

18:00:07 14 you questions about, the three inches over the hip,

18:00:12 15 the first two lines of that --

18:00:15 16 Do you want to flip to that, the three

18:00:17 17 inches over the hip?

18:00:29 18 A. Yes.

18:00:31 19 Q. Okay. So the first two rows of the chart

18:00:34 20 show temperatures at 70.7 degrees Fahrenheit and 71.4

18:00:39 21 degrees Fahrenheit; correct?

18:00:40 22 A. That's correct.

18:00:43 23 Q. And that's with the Bair Hugger off.

18:00:43 24 A. Yes.

18:00:43 25 Q. All right. And then there are two

18:00:46 1 subsequent measures, 64.9 degrees and 64.6 degrees
18:00:52 2 with the Bair Hugger on; correct?
18:00:54 3 A. Yes.
18:00:55 4 Q. And I think you testified earlier that it
18:00:58 5 didn't make sense to have those values in sequence; in
18:01:03 6 other words, to have the temperature drop by five
18:01:05 7 degrees; correct?
18:01:06 8 A. That's correct.
18:01:07 9 Q. All right. So how would you explain what's
18:01:12 10 reported on this chart?
18:01:12 11 MR. ASSAAD: Objection, lack of foundation,
18:01:14 12 calls for speculation.
18:01:17 13 A. As I mentioned before, we do not have a
18:01:21 14 timestamp on any of the data here, so the data
18:01:25 15 presented in a given area were probably taken at
18:01:28 16 different times.
18:01:30 17 Q. Okay. What was your overall goal in taking
18:01:45 18 the measurements reflected in Appendix B to your
18:01:49 19 report? What was -- what was the purpose of doing it?
18:01:51 20 A. I wanted some first-hand experience myself
18:01:59 21 of what the -- primarily the velocities were near the
18:02:03 22 entrance to the filter near the floor and near the
18:02:07 23 edge of the blanket, so the -- and it was really --
18:02:12 24 Obviously, it's not an OR, I appreciate
18:02:14 25 that, so it's not going to be a -- a purely totally

334

18:02:19 1 accurate, reproducible set of results that one would
18:02:23 2 obtain in an OR. It was intended to be a preliminary
18:02:26 3 study to get some reasonable data in terms of the --
18:02:29 4 mainly velocity, and since we had temperature
18:02:31 5 capability, we also included the temperature
18:02:34 6 measurements.

18:02:34 7 Q. So in your review of the plaintiffs' expert
18:02:39 8 reports, did you -- did you see any measurements of
18:02:43 9 temperature or velocity around a Bair Hugger in any of
18:02:45 10 their reports?

18:02:46 11 A. No, I did not.

18:02:48 12 Q. And was your intent for this preliminary
18:02:53 13 exhibit to be of publishable quality?

18:02:56 14 A. Certainly not.

18:02:57 15 Q. Okay. Okay. With respect to your
18:03:40 16 calculation of the Archimedes number, you were asked
18:03:43 17 questions about the proper value for L in that
18:03:50 18 equation. Do you recall that?

18:03:51 19 A. I recall that.

18:03:52 20 Q. Okay. If the L were a different value, how
18:04:03 21 would that affect your opinions in this case, if at
18:04:05 22 all?

18:04:06 23 MR. ASSAAD: Objection, calls for
18:04:07 24 speculation.

18:04:08 25 A. I don't think it would affect my opinions if

18:04:11 1 we increased L to make it the distance from the edge
18:04:15 2 where the jet was emanated to someplace in the jet.
18:04:19 3 The delta T would also diminish, and so since the
18:04:22 4 Archimedes number is a very low value now, I don't
18:04:25 5 think it would change my opinion.

18:04:27 6 Q. Okay. If you look at Exhibit 15, which is
18:04:34 7 your article that was published in the Journal of
18:04:40 8 Solar Energy Engineering, pages 369 and the top of
18:04:56 9 370, and you were asked questions about your
18:05:02 10 statements about monitoring particles in -- in a
18:05:11 11 healthcare environment; correct?

18:05:12 12 A. Yes.

18:05:13 13 Q. All right. And you were asked about the use
18:05:19 14 of a particle counter to measure the total aerosol
18:05:23 15 concentration; correct?

18:05:24 16 A. Yes.

18:05:24 17 Q. All right. Is a particle counter alone
18:05:29 18 sufficient to measure a bioaerosol concentration in a
18:05:33 19 healthcare environment?

18:05:34 20 A. A particle counter is not capable of
18:05:38 21 measuring -- or distinguishing between a --

18:05:40 22 Q. Okay.

18:05:40 23 A. -- biological particle and a non-biological
18:05:42 24 particle.

18:05:42 25 Q. So what you say here is an alternative is to

18:05:45 1 use a continuous particle counter for the measurement
18:05:49 2 of total aerosol concentration versus time with
18:05:52 3 periodic sampling for bioaerosol. What were you
18:05:55 4 referring to when you mentioned "periodic sampling for
18:05:59 5 bioaerosol?"

18:06:01 6 A. That periodic sampling for bioaerosols could
18:06:05 7 be done using a -- a sled impactor, for example, or an
18:06:08 8 Andersen impactor.

18:06:09 9 Q. And would you need to use those in order to
18:06:11 10 have a real understanding of the bioburden in that
18:06:13 11 room or environment?

18:06:15 12 A. Yes, because an optical particle counter
18:06:18 13 does not provide information on the biological nature
18:06:21 14 of the particle.

18:06:21 15 Q. Okay. I believe counsel asked you
18:06:35 16 whether -- whether the Bair Hugger use could transport
18:06:41 17 particles to the surgical site. Do you recall that
18:06:43 18 question?

18:06:43 19 A. I do.

18:06:44 20 Q. Okay. What -- what is your -- and --
18:06:47 21 And I think your answer was "Well,
18:06:49 22 possibly."

18:06:50 23 A. I -- I think that was my response.

18:06:52 24 Q. And what did you mean by that or what was
18:06:54 25 the basis for that response?

18:06:56 1 A. I don't think it's very likely, but there
18:06:58 2 are various factors in an operating room that may
18:07:02 3 change, so under certain conditions it -- it could be
18:07:04 4 possible.

18:07:05 5 Q. So there are other pieces of equipment in
18:07:11 6 the OR that move air; fair?

18:07:16 7 A. Yes.

18:07:16 8 Q. All right. And there are people in the --

18:07:21 9 MR. ASSAAD: Objection.

18:07:21 10 MR. GOSS: Sorry, I'm -- I'm leading.

18:07:23 11 MR. ASSAAD: Object to the form.

18:07:24 12 Q. Let me -- let me try it this way: What --
18:07:26 13 what are the different things in an operating room
18:07:29 14 that could cause the movement of -- of particles to
18:07:33 15 the surgical site or anywhere else?

18:07:35 16 A. Well number one --

18:07:37 17 MR. ASSAAD: Objection, outside the scope of
18:07:39 18 his report, outside -- it's outside the scope of my
18:07:43 19 direct, and --

18:07:49 20 A. Could you repeat the question again?

18:07:50 21 Q. Sure. My question was -- hold on a second.
18:08:10 22 So you said there are various factors in an
18:08:12 23 operating room that may change. What are -- what are
18:08:15 24 some of the factors you have in mind there?

18:08:18 25 MR. ASSAAD: Objection, lack of foundation,

18:08:19 1 object to form.

18:08:20 2 A. Again, I would envision an operating room

18:08:24 3 has several personnel, surgeons, anesthesiologists,

18:08:30 4 other -- other personnel that would be moving tools

18:08:34 5 that would -- that would be in operation, tools being

18:08:38 6 handed to the surgeon and -- and -- and vice versa, so

18:08:41 7 quite a bit of movement around the surgical site.

18:08:44 8 Q. All right. You were asked some questions

18:08:51 9 about a couple of other patient warming products, one

18:08:57 10 was the Mistral and the other was Warmtouch. Both of

18:09:02 11 those incorporate HEPA filters, or so you were told

18:09:05 12 by -- by plaintiffs' counsel. Do you recall that?

18:09:08 13 A. Yes, I do.

18:09:09 14 Q. All right. Does -- does a HEPA filter

18:09:12 15 remove 100 percent of particles from the air?

18:09:17 16 A. No. Even a HEPA filter allows some

18:09:19 17 particles through.

18:09:21 18 Q. And are there potential disadvantages to

18:09:25 19 using a HEPA filter from an engineering standpoint?

18:09:30 20 A. Well a HEPA filter generally creates a

18:09:33 21 higher pressure drop to the filter, which would mean a

18:09:36 22 lower pressure drop on the downstream side of the

18:09:39 23 filter around the fan, which could potentially

18:09:41 24 aggravate any leaks between the filter and the housing

18:09:45 25 or leaks between the filter media and the filter

339

18:09:46 1 frame.

18:09:49 2 MR. GOSS: Okay. That's all I have for now.

18:09:51 3 MR. ASSAAD: A few follow-up.

4 RECROSS-EXAMINATION

18:09:53 5 BY MR. ASSAAD:

18:09:53 6 Q. What's the definition of a HEPA filter?

18:09:55 7 A. A HEPA filter is typically --

18:10:01 8 Q. Let me make it quick. Do you agree that

18:10:06 9 it's a MERV 17 or above?

18:10:08 10 (Discussion off the stenographic record.)

18:10:08 11 MR. GOSS: Object to form.

18:10:09 12 A. I believe that was in the -- in the ASHRAE

18:10:13 13 table I included in my -- my report.

18:10:16 14 Q. And ASHRAE is authoritative; correct?

18:10:18 15 A. Yes.

18:10:18 16 Q. Okay. So a HEPA filter removes 99.97

18:10:22 17 percent of .3 microns to one micron; correct?

18:10:26 18 A. That's what it states here, although they

18:10:33 19 are typically measured at just 0.3 microns, but then

18:10:37 20 the efficiency actually increases for particle sizes

18:10:40 21 larger than .3.

18:10:41 22 Q. So higher than 99.97; correct?

18:10:43 23 A. Yes.

18:10:44 24 Q. Almost to a hundred percent; correct?

18:10:45 25 A. In some particle sizes, yes.

340

18:10:47 1 Q. Well between three to 10 particles, what's
18:10:52 2 the efficiency rating for a HEPA filter?

18:10:52 3 A. I don't have a -- a precise number I can
18:10:56 4 give you.

18:10:57 5 Q. Would agree with me that it's larger than
18:11:00 6 99.999 percent?

18:11:00 7 A. I --

18:11:02 8 Again, without looking at -- at the
18:11:06 9 evidence, I -- I -- I could not agree with that.

18:11:08 10 Q. Well .3 to .1 for a MERV 17 is 99.97;
18:11:12 11 correct?

18:11:12 12 A. Say that again.

18:11:16 13 Q. The efficiency for a HEPA filter at -- at
18:11:20 14 MERV 17 is greater than or equal to 99.97 percent
18:11:25 15 efficiency for .3 to one micron; correct?

18:11:27 16 A. Yes, that's correct.

18:11:28 17 Q. Okay. And when you go from one to three or
18:11:30 18 three to 10, it will be greater than 99.97; correct?

18:11:35 19 A. That's correct.

18:11:35 20 Q. Okay. So sitting here today, you are purely
18:11:40 21 speculating as to whether particle -- particles that
18:11:45 22 could carry bacteria could pass through a -- a HEPA
18:11:47 23 filter; correct?

18:11:49 24 MR. GOSS: Object to form.

18:11:49 25 A. Again, HEPA filters are not a hundred

18:11:52 1 percent efficient. It's possible that some very small
18:11:56 2 number could get through at larger particle sizes.

18:11:58 3 Q. Well it's definitely less than .03 percent
18:12:02 4 of the particles, correct, for that size?

18:12:05 5 A. Depending on the particle size of interest,
18:12:07 6 that could be true.

18:12:09 7 Q. Okay. And you agree with me that a HEPA
18:12:12 8 filter is going to filter out more bacteria than a
18:12:16 9 MERV 14 filter.

18:12:17 10 MR. GOSS: Objection, form.

18:12:17 11 A. Yes, I --

18:12:20 12 Yes.

18:12:21 13 Q. Okay. Let's think about other --
18:12:27 14 You mentioned other -- there might be other
18:12:31 15 factors that could cause contamination of the surgical
18:12:38 16 site. I think you mentioned people moving, stuff like
18:12:40 17 that. Is that correct?

18:12:41 18 A. Yes.

18:12:41 19 Q. Okay. When did you formulate that opinion?
18:12:53 20 Just outside now when you spoke with counsel?

18:12:56 21 MR. GOSS: Object to the form.

18:12:58 22 A. No. I think I -- I may have read that in
18:13:01 23 some of the ASHRAE documentation on the -- the
18:13:03 24 hospital design guide or somewhere else.

18:13:05 25 Q. Where? Is it in your report?

342

18:13:09 1 A. That specific statement is probably not in
18:13:12 2 my report.

18:13:12 3 Q. What's your basis to support that statement
18:13:14 4 that -- that -- that people moving in the operating
18:13:21 5 room could cause surgical-site infections?

18:13:23 6 MR. GOSS: Object to the form. I don't
18:13:25 7 think that was his testimony.

18:13:28 8 Q. Did I misstate your testimony?

18:13:32 9 A. Without going back and -- and reviewing what
18:13:35 10 I said, it may have.

18:13:40 11 Q. Now you also mentioned with the Archimedes
18:13:43 12 equation that if you change the L, it would change the
18:13:46 13 delta T. What's your basis behind that?

18:13:50 14 A. Because as a heated jet propagates through
18:13:56 15 air, it's going to be losing the temperature
18:14:01 16 difference -- the maximum temperature difference
18:14:02 17 between the -- the jet and at ambient as it gets
18:14:06 18 further away from the -- the source of the jet.

18:14:08 19 Q. Well we're not just talking about one jet
18:14:10 20 here, we're talking about thousands of jets.

18:14:13 21 A. I'm talking about the combined air leaving
18:14:15 22 the edge of the blanket entering the room, not that --
18:14:19 23 not individual holes in the blanket.

18:14:20 24 Q. And you -- and you are assuming that delta T
18:14:22 25 would change?

18:14:23 1 A. Yes.

18:14:23 2 Q. And what's your basis behind that?

18:14:26 3 A. I think that's -- that's engineering

18:14:28 4 knowledge about thermal jets as they propagate into --

18:14:33 5 into room air.

18:14:34 6 Q. Okay. So you're saying --

18:14:35 7 But the delta change might actually increase

18:14:38 8 depending on where you take the measurement.

18:14:40 9 A. I have -- I have never seen that.

18:14:41 10 Q. Okay. With respect to Exhibit B, you have

18:15:16 11 no idea sitting here today in what order you took

18:15:19 12 those measurements; correct?

18:15:20 13 A. Not based on what's provided in Exhibit B,

18:15:24 14 no.

18:15:24 15 Q. Are they in your notes anywhere?

18:15:26 16 A. I was not the one taking the notes.

18:15:28 17 Q. Oh. Who took the notes?

18:15:30 18 A. Peter and Vinita.

18:15:31 19 Q. Okay.

18:16:07 20 (Discussion off the record.)

18:16:29 21 BY MR. ASSAAD:

18:16:29 22 Q. Do you agree that in a typical orthopedic

18:16:38 23 surgery you're going to have people moving --

18:16:39 24 You're going to have surgeons; correct?

18:16:41 25 A. Yes.

18:16:42 1 Q. And they'll be moving; correct?

18:16:43 2 A. Yes.

18:16:43 3 Q. And you'll have other staff in the operating

18:16:45 4 room; correct?

18:16:46 5 A. Yes.

18:16:46 6 Q. And the devices, like the anesthesia machine

18:16:51 7 as well as any other device; correct?

18:16:53 8 A. Yes.

18:16:53 9 Q. Okay. There's a constant set of people and

18:16:58 10 devices in an operating room; correct?

18:16:59 11 A. I don't know about constant set, but there's

18:17:03 12 certainly a -- a -- a variety of human operations --

18:17:06 13 operators, typically, and equipment.

18:17:08 14 Q. And you agree with me that in Elghabashi's

18:17:13 15 report, that he looked at the impact of the Bair

18:17:19 16 Hugger with all those -- with people in the room;

18:17:23 17 correct?

18:17:23 18 A. Yes.

18:17:24 19 Q. With lights; --

18:17:25 20 A. Yes.

18:17:25 21 Q. -- correct?

18:17:26 22 With the back tables.

18:17:27 23 A. Yes.

18:17:28 24 Q. Okay. And it's because that people are

18:17:32 25 going to affect the airflow in a room; correct?

345

18:17:37 1 A. Yes.

18:17:38 2 Q. And there's going to be some thermal plumes

18:17:42 3 that come off from people; correct?

18:17:44 4 A. Right.

18:17:44 5 Q. Okay. And when you want to model something

18:17:50 6 in CFD, in a CFD model, you want to be as precise as

18:17:56 7 possible; correct?

18:17:56 8 A. Yes.

18:17:57 9 Q. If you want to model whether or not

18:17:59 10 particles get to the surgical site, you'd want to have

18:18:03 11 a heat source from the lights; correct?

18:18:05 12 A. Yes.

18:18:06 13 Q. You'd want to have people in the room;

18:18:09 14 correct?

18:18:09 15 A. And they really should be moving as they are

18:18:11 16 in an actual OR.

18:18:12 17 Q. Well have you ever tried to do a dynamic

18:18:15 18 model of a CFD?

18:18:16 19 A. Very difficult with motion, but that -- that

18:18:18 20 would be required to do an actual analysis.

18:18:20 21 Q. I understand that, but -- but -- but say you

18:18:22 22 want to do a static model, you still would want to

18:18:25 23 have people in there with a heat source; correct?

18:18:27 24 A. Yes.

18:18:27 25 Q. Okay. And you'd want to have the heat

18:18:31 1 source -- you'd want to have the heat source coming
18:18:35 2 from the walls; correct?

18:18:36 3 A. If -- if there is any heat transfer, yes.

18:18:39 4 Q. All right. And you agree with me that the

18:18:46 5 more accurate a static model is in the -- in its

18:18:50 6 modeling, the more accurate the CFD results; correct?

18:18:53 7 A. If it's set up correctly and the boundary

18:18:57 8 conditions are done correctly. Again, I'll go back to

18:18:59 9 the lack of motion of anything in the OR.

18:19:02 10 Q. Say again.

18:19:03 11 A. I go back to the lack of motion of anything

18:19:05 12 in the OR. That's -- that's a major contributor to

18:19:08 13 mixing of particles.

18:19:09 14 Q. Okay. Now let's talk about that for a

18:19:12 15 second. Okay? You agree with me that in a

18:19:17 16 unidirectional OR such as what's used mostly in --

18:19:23 17 in -- in orthopedic surgeries, that the purpose of

18:19:32 18 having diffusers above the surgical table is to offer

18:19:37 19 a protective effect to help prevent bacteria from

18:19:42 20 getting into the critical site, the surgical site;

18:19:45 21 correct?

18:19:45 22 A. That -- that's the idea, yes.

18:19:47 23 Q. Okay. And you don't want to have a device

18:19:49 24 in the operating room that's going to reduce the

18:19:53 25 protective effect of the ventilation system in an

18:19:57 1 operating room; correct?

18:19:58 2 A. You would not want that, yes.

18:20:01 3 Q. Okay. Because if you reduce the protective

18:20:06 4 effect of the ventilation system, then you increase

18:20:12 5 the risks of bacteria entering into the surgical site

18:20:16 6 from other sources in the operating room; correct?

18:20:18 7 MR. GOSS: Objection to form, it's beyond

18:20:20 8 the scope of his opinions, and it is an incomplete

18:20:26 9 hypothetical.

18:20:28 10 A. Say that again.

18:20:50 11 Q. If you reduce the protective effect in the

18:21:06 12 ventilation system, then you increase the risk of

18:21:10 13 bacteria entering into the surgical site from other

18:21:13 14 sources in the operating room; correct?

18:21:15 15 MR. GOSS: Object to form, beyond the scope

18:21:18 16 of his opinions, incomplete hypothetical.

18:21:20 17 A. That -- that could be possibly correct.

18:21:22 18 Q. Well you have unidirectional flow coming

18:21:26 19 down; correct?

18:21:27 20 A. Except the wake regions under the surgeon's

18:21:33 21 arms and tools and other things are blocking the

18:21:35 22 airflow.

18:21:35 23 Q. I understand that. But if you affect the --

18:21:37 24 the intensity of the protective effect, you basically

18:21:40 25 decrease the force field around the patient that the

348

18:21:42 1 ventilation system is meant to -- to attain; correct?

18:21:45 2 MR. GOSS: Asked and answered, beyond the

18:21:48 3 scope of his opinions.

18:21:49 4 A. Again, I think the full recirculatory -- full

18:21:51 5 recirculation regions under a surgeon's arms and hands

18:21:56 6 and -- and tools also disrupt the flow.

18:21:59 7 Q. I understand that. But you don't want to

18:22:01 8 disrupt the flow even more with another device;

18:22:04 9 correct?

18:22:04 10 MR. GOSS: Object to form, beyond the scope

18:22:06 11 of his opinions.

18:22:08 12 A. I think that disruption of the flow would be

18:22:09 13 much more than a small change in temperature.

18:23:02 14 MR. ASSAAD: Okay. That's all I have.

18:23:03 15 Thank you.

18:23:05 16 MR. GOSS: It's been a long day. I just

18:23:07 17 have one question. Well, one -- one theme.

18:23:08 18 RE-REDIRECT EXAMINATION

18:23:08 19 BY MR. GOSS:

18:23:13 20 Q. So you --

18:23:17 21 Counsel asked you whether a HEPA filter

18:23:20 22 would capture more bacteria than a MERV 14 filter. Do

18:23:25 23 you -- do you recall that?

18:23:26 24 A. Yes.

18:23:26 25 Q. Okay. Have you done any experimental work

349

18:23:30 1 yourself to try to quantify the difference in
18:23:34 2 bacterial capture between MERV 14 and HEPA?
18:23:38 3 A. I have not. That's strictly based on the
18:23:41 4 published efficiency value versus the particle size of
18:23:45 5 HEPA filters and MERV 14 filters.

18:23:47 6 MR. GOSS: And I'll leave it at that.

18:23:54 7 MR. ASSAAD: That's all I have. Thank you.

18:23:56 8 THE REPORTER: Off the record, please.

18:23:59 9 (Deposition concluded.)

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

350

1 C E R T I F I C A T E

2 I, Richard G. Stirewalt, hereby certify that
3 I am qualified as a verbatim shorthand reporter, that
4 I took in stenographic shorthand the deposition of
5 THOMAS H. KUEHN at the time and place aforesaid, and
6 that the foregoing transcript is a true and correct,
7 full and complete transcription of said shorthand
8 notes, to the best of my ability.

9 Dated at Minneapolis, Minnesota, this 16th
10 day of July, 2017.

11

12

13

14

15

16

17 RICHARD G. STIREWALT

18 Registered Professional Reporter

19 Notary Public

20

21

22

23

24

25

351

1 C E R T I F I C A T E

2 I, THOMAS H. KUEHN, hereby certify that I
3 have carefully read the foregoing transcript, and that
4 the same is a true and complete, full and correct
5 transcription of my deposition, except:

6 PAGE/LINE CHANGE REASON

7

8

9

10

11

12

13

14

15

16

17

THOMAS H. KUEHN

18

Deponent

19

20

Signed and sworn to before me this ____ day of
21 August, 2017.

22

23

24

Notary Public

25